

RECORDS CODE SHEET
SND 4535 (Rev. 5-60)

NAVAL AVIATION SAFETY CENTER

GENERAL
(Card No. 1)

SUPPLEMENTARY
(Card No. 2)

Bureau Number	146982	16-21	Weather		16-21
Reporting Custodian	132	22-24	Kind of Flight	1A6	22-24
Type of Duty	21	25-26	Relative Wind - Direction	X	25
Major Command	1	27	Relative Wind - Velocity	1	26
Aircraft Damage	A	28	Relative Wind (Old Code - Not in Use)		27
Aircraft Injury	E	29	Clearance	2	28
Maneuver prior to Accident	D	30	Time of Day	2	29
First Accident type	E4	31-32	Number of other Aircraft		30
First Accident phase	473	33-35	Altitude of Occurrence	200	33-35
Second Accident type	G87	36-37	Distance from Field	Coded on	38-40
Second Accident phase	A2	38-40	Length of Runway	forced landings	41-42
Type of Operation	3	41-42	Field Elevation	only	43-45
Contributing Cause Factors	34	43-47	Non-Navy Injury ("R")		47
Pilot Factor, First		48-49	Number of "A" or "L" or "M" Injury		48-49
Pilot Factor, Second		50-51	Number of "B" Injury		50-51
Pilot Factor, Third		52-53	Number of "C" Injury		52-53
First other Personnel Factor		54-55	Number of "D" Injury		54-55
Second other Personnel Factor		56-57	Number of "E" Injury	01	56-57
Primary Major Material Factor	A	58	Location	AGYUMA	62-68
Second Major Material Factor		59	Facility Data	D0	69-74
Design	A	60	ACCIDENT DAMAGE	A	
Facilities		61	ACCIDENT INJURY	E	
Special Data & Cond.	8GDU	62-68	FISCAL YEAR	78	
Type of Flight Hazard		69	SPECIAL ATTN: ("X")	X	
Pri. Cause/Avoidable Inc. or Flt Haz or Gr Acc't	3	70	IBM: The above Fields are to be punched in all Coded Code		
Recommendation Code		71-72	Model Code	17	
Carrier Hull Number		73-74			
No Personnel Card ("R")		80			

PERSONNEL STATISTICS
(Card No. 3)

File Number	Pilot Name	Dual Pilot Name	Rank/Rate	Br Service	Age	Yrs Experience	Status	Position	Inj to Ind	Abandon A/C	Pilot Factor	Trainer Utilization	Instr. Card	Total Time All Models	All Models 3 Months	All Series This Model	All Ser Mod 3 Months	CV Landings	Instrument Hours	Nite Hours	Total Time Jet available
(b) (6)	(b) (6)		16	17	18	19	20	21	32	33	34	35	36	37	38	39	40	41	42	43	44
03	(b) (6)		56	5	0	A	1	E	2	2	0	5	2	0	3	0	4	0	3	0	3
04			22	23	24	25	26	27	28	29	30	31									
			16	17	18	19	20	21													

IBM: PERSONNEL CODED ON REVERSE SIDE ☐

CODED she REVIEWED (b) (6) LOGGED (b) (6) PUNCHED (b) (6) VERIFIED (b) (6) REVIEWED (b) (6) EPUNCHED (b) (6)

CODE SHEET REVIEWED BY CLASS DESK ANALYST (b) (6) (Initial) (b) (6) (Date)

11-9-60

R DEPT CODE SHEET

☐

Don't
Count

☐

Other
Aircraft

75	76	77	78	79
2	1	7	6	2

PAGE 1

Year	Month	Day	Type Occurrence Sequence	Damage Injury	Model Aircraft									
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	0	9	0	9	1	0	1	A	E	F	B	U	2	

Bureau Number

146982

NARRATIVE BRIEF

16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70															
A/C OVERRAN TOW A/C FLIPPED INTO VIOLENT MANEUVERS +																																																																					
VERT ROLL DIVE 20M FT/400 KT. UH. PRESS. LOST. RECOVERED																																																																					
LEVEL FLT 4M FT/400 KT. LEADER JOINED DAM. A/C NOTED RH																																																																					
LF DROP, OUTER WING PANEL + TAIL FIN MISSING V A/C.																																																																					
UNABLE MAINTAIN CONTROL A/C BELOW 250 KT. CLIMB 20M/																																																																					

Prepared by

Reviewed

Punched

F NOV 17 1961

Verified

Note to IBM: Route code sheet to Open File upon completion of Brief Cards.

SEE PAGE - 2

F R DEPT CODE SHEET

☐

Don't
Count

☐

Other
Aircraft

75	76	77	78	79
21	7	2		

PAGE 2

Year	Month	Day	Type Occurrence Sequence	Damage Injury	Model Aircraft									
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	0	9	0	9	1	0	1	4	E	F	8	4	2	

Bureau Number

1	4	6	8	0	2
---	---	---	---	---	---

NARRATIVE BRIEF

16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70															
250 KE EJECTED. CAUSE-M.F-DESIGN. STAD WING HINGE PINS FAILED COMPLETE FULL TRAVEL. WING HINGE PIN LOCK FAILED INDICATE UNSAFE CONDITION. ASC 303 INCORP. X																																																																					

Prepared by (b) (6)

Reviewed

Punched

F NOV 17 1961

Verified

Note to IBM: Route code sheet to Open File upon completion of Brief Cards.

U. S. NAVAL AVIATION SAFETY CENTER
U. S. NAVAL AIR STATION
NORFOLK 11, VIRGINIA

NASC/111/rw
Ser: 313
15 February 1962

SPECIAL HANDLING REQUIRED IN ACCORDANCE
WITH PARAGRAPH 70, OPNAVINST 3750.6D

From: Commander, U. S. Naval Aviation Safety Center
To: Commanding Officer, Fighter Squadron ONE HUNDRED TWENTY FOUR

Subj: VF-124 AAR ser 7-61 concerning F8U-2 BuNo 146982, accident occurring
9 September 1961, pilot (b) (6)

1. The subject report and all endorsements thereon have been reviewed. The Naval Aviation Safety Center concurs with the comments and recommendations of the Aircraft Accident Board as modified by subsequent endorsers.

2. The cause of this accident has been recorded by the Center indicating material failure or malfunction as the primary contributing factor and material failure (design) as an additional contributing factor.

(b) (6)

By direction

Copy to:
BUWEPs (C-13) (2)
COMNAVAIRPAC
CINCPACFLT
COMFAIRSDIEGO
COMCARAIRGRU 12
CO MCAAS YUMA
CG FIRSTMAW
CG THIRDMAW
BUWEPsREP DALLAS
CO NAVPARAFAC EL CENTRO
CO VMF-334
CO VF-24, 51, 91, 111, 154, 191, 211
CO LIGHTPHOTORON 63

4

15 DEC 1961

SPECIAL HANDLING REQUIRED IN ACCORDANCE
WITH PARAGRAPH 70, OPNAVINST 3750.6D

FIFTH ENDORSEMENT on FITRON 124 AAR ser 7-61 concerning F8U-2 BUNO
146982 accident occurring 9 September 1961 pilot (b) (6)

From: Chief, Bureau of Naval Weapons
To: Commander, U. S. Naval Aviation Safety Center

Subj: FITRON 124 AAR ser 7-61

1. Forwarded.

2. Bureau of Naval Weapons message 201431Z of October revised adjustment procedures for the Wing Fold Sequence Valve to insure sufficient linear travel. Lockwiring the adjustment nut is also directed. Applicable publications are being revised accordingly.

3. The present statement concerning wing fold operation in all F8U Flight Handbooks, "Operate Wing Fold lock lever to full aft detent ---" is considered adequate.

4. Inspection and re-rigging of the wing spread sequence valve setting is not considered necessary in view of the above action and upon incorporation of F8U, Aircraft Service Change 374, Wing Fold Locking Mechanism Inspection Ports.

(b) (6)

BY direction

Copy to:
COMNAVAIRPAC
CINCPACFLT
COMFAIRSDIEGO
COMCARAIRGRU 12
CO MCAAS, YUMA
CO FITRON 124

5

6 NOV 1961

SPECIAL HANDLING REQUIRED IN ACCORDANCE
WITH PARAGRAPH 70, OPNAVINST 3750.6D

FOURTH ENDORSEMENT on FITRON 124 AAR ser 7-61 concerning F8U-2 BUNO
146982 accident occurring 9 September 1961 pilot (b) (6)

From: Commander Naval Air Force, U. S. Pacific Fleet
To: Commander, U. S. Naval Aviation Safety Center
Via: Chief, Bureau of Naval Weapons

Subj: FITRON 124 AAR ser 7-61

1. Readdressed and forwarded, concurring in the comments and recommendations of the Aircraft Accident Board, as modified by the subsequent endorsements.
2. As a result of this accident and the information gained in the subsequent investigation, COMNAVIAIRPAC message 230039Z of September set forth in detail the problem areas associated with the F8U wing fold system. This message further required an immediate (not later than next daily pre-flight) inspection of the wing hinge lock mechanism and security of the sequence valve locknut; this inspection to be followed by a complete re-rigging of the wing fold system not later than 6 October. The contractor was then requested to investigate the sequence valve rigging to provide greater linear distance of the adjusting bolt rigged position from the "critical" position. Chance Vought letter AER-E1D-330 of 13 October concurred in the need to provide greater linear distance on the adjusting bolt and the need to clarify the wing fold rigging instructions presently contained in the Handbook of Maintenance Instructions. COMNAVIAIRPAC is presently preparing an F8U Aircraft Bulletin to include all the revised rigging procedures for the wing fold system. O&R Norfolk is preparing ASC 374, which will provide wing fold locking mechanism inspection ports. An ECP (Engineering Change Proposal) has been submitted to BUWEPS which will rework the cockpit wing fold unlock handle to preclude operating the wing fold actuating lever until the unlock handle is in the full aft position.
3. For purposes of safety awards this accident is administratively charged to FITRON 124.

(b) (6)

By direction

Copy to:
BUWEPS (C 13)
COMNAVAVNSAFECEN

FF4-1/3750

SPECIAL HANDLING REQUIRED IN ACCORDANCE
WITH PARAGRAPH 70, OPNAVINST 3750.6D

Copy to: (Continued)
CMC (CODE AAP)
CINCPACFLT
COMFAIRSDIEGO
CGFIRSTMAW
CGTHIRDMAW
COMCARAIRGRU 12
CO MCAAS, YUMA
BUWEPS REP DALLAS
CO NAVPARAFAC EL CENTRO
CO MARFITRON 334
CO LIGHTPHOTORON 63
CO FITRON 24, 51, 91, 111, 124, 154, 191, 211

6

FF7/3750

Serial:

80/ 1973

SPECIAL HANDLING REQUIRED IN ACCORDANCE
WITH PARAGRAPH 70, OPNAV INST 3750.6D

OCT 23 1961

THIRD ENDORSEMENT on VF-124 AAR 7-61 concerning F8U-2 BUNO 146982
accident occurring 9 SEP 1961, Pilot (b) (6)

From: Commander Fleet Air San Diego
To: Commander, U.S. Naval Aviation Safety Center
Via: Commander Naval Air Force, U.S. Pacific Fleet

Subj: VF-124 Aircraft Accident Report ser 7-61 of 9 SEP 1961;
forwarding of

1. Forwarded, concurring with the comments and recommendations of the
Aircraft Accident Board as modified by subsequent endorsements.

(b) (6)

Copy to:

NAVAVNSAFECEN

BUWEPS

CINCPACFLT

CMC (Code AAP)

OINC, NPU, EL CENTRO

BUWEPSREF, DALLAS

CO, MCAAS Yuma

1st, 3rd MAW

CO, VF-124

CO, VF-174

CO, VMF-334

CO, VFP-63

CO, VF-24

CO, VF-51

CO, VF-91

CO, VF-111

CO, VF-154

CO, VF-191

CO, VF-211

COMCVG-12

7

ORIGINAL

FF12/COMCVG-12
3750
Ser: 80/1051
6 OCT 1961

SPECIAL HANDLING REQUIRED IN ACCORDANCE WITH
PARAGRAPH 69 AND 70 OF OPNAV INST 3750.6D

SECOND ENDORSEMENT on VF-124 AAR 7-61 concerning F8U-2 BuNo 146982
occurring 9 SEP 1961, Pilot (b) (6)

From: Commander Carrier Air Group TWELVE
To: Commander Naval Aviation Safety Center
Via: (1) Commander Fleet Air San Diego
(2) Commander Naval Air Force, U. S. Pacific Fleet

Subj: VF-124 AAR 7-61; forwarding of

1. Forwarded. The primary cause of this accident is material/design malfunction.

2. The fact that the hydraulic wing hinge pins can be adjusted to an intermediate position is a potentially dangerous situation and constitutes an unacceptable design "booby trap" for the operating forces. There is a requirement other than the present mechanical locking mechanism for determining that the hydraulic wing hinge pins are fully extended.

3. AAR Board recommendations:

(5) A simple visual indicator is recommended that will actuate exclusively with fully extended wing hinge pin movement. This combined with the present mechanical lock would provide system integrity.

4. Concur with the recommendations of the board and the remarks contained in the first endorsement.

(b) (6)

Copy to:

NAVAVNSAFECEN

BUWEPF

CINCPACFLT

CNC (Code AAF)

OINC, NPU, El CENTRO

BUWEPFREP, Dallas

CO, MCAS Yuma

1st, 3rd MAW

CO, VF-124

CO, VF-174

CO, VMF-334

CO, VFP-63

CO, VF-24

CO, VF-51

CO, VF-91

CO, VF-111

CO, VF-154

CO, VF-191

CO, VF-211

8
ORIGINAL

ORIGINAL

VF124/00:a1
3750
29 September 1961

FIRST ENDORSEMENT on VF-124 AAR Serial 7-61 concerning F8U-2, BUNO 146982, accident occurring 9 Sep 1961, Pilot (b) (6)

From: Commanding Officer, Fighter Squadron ONE TWO FOUR (VF-124),
U.S. Naval Air Station, Miramar 45, California
To: Commander Naval Aviation Safety Center
Via: (1) Commander Carrier Air Group TWELVE
(2) Commander Fleet Air San Diego
(3) Commander Naval Air Force, U.S. Pacific Fleet

Subj: VF-124 Aircraft Accident Report 7-61; forwarding of

1. Forwarded, concurring with the comments and recommendations of the Aircraft Accident Board as follows:

a. Comments. Concur.

b. Recommendations.

(1) Concur. Revision of the F8U-1 and 1E HMI, NAVWEPS 01-4511-A-502 para 2-701A, should be accomplished in the same manner. The extension check for the F8U-1 and 1E is covered in Figure No. 2-112 steps #25 and #26.

(2) Concur. The lock nut should be safetied to the plunger, then the adjusting bolt may be safetied to either the lock nut or plunger. The present situation of safety wiring the adjusting bolt to the plunger ignores the primary purpose of "Safety wire", namely to guarantee the position of a locking mechanism, in this case the lock nut.

(3) Concur.

(4) Concur. This caution has already been placed in the HMI of F8U-1, -1E, -2, -2N aircraft as follows: "The wing fold door must be moved through its complete travel until the door open detent is engaged to assure proper operation of the hinge pin lock mechanism". This same caution note should be added to the pilot's Flight Handbook, and promulgated to all pilots immediately.

(5) Concur in part. Unless: (1) it is acceptable for the mechanical locking mechanism to be left without an external visual actuation indicator, or (2), the proposed wing hinge pin actuated external indicator is to indicate, by mechanical series action, locked indications from both of the wing hinge pin and mechanical lock, or (3), it is acceptable to have no external indication of either the wing hinge pin or mechanical locks being in place; it is suggested that for normal operations, particularly carrier work, that an external indicator is mandatory and further that normally high incidence of failure of a series micro switch arrangement as contemplated in the recommendation leaves something to be desired. It is suggested that the present locking indicator arrangement might be satisfactory if the intent of ASC 303 was in fact accomplished. 9

SPECIAL HANDLING REQUIRED IN ACCORDANCE WITH OPNAVINST 3750.6D, PARA. 70

ORIGINAL

VF124/00:a1
3750

2. COMNAVAIRPAC Report Symbol 3750-1 will not be submitted.
3. The COMNAVAIRPAC Safety Survey was completed in August 1961.

(b) (6)



Copy to:

COMNAVAVSAFCEN (2cc direct Air Mail)

BUWEPS (1cc direct Air Mail)

CINCPACFLT

COMNAVAIRPAC

COMFAIRSDIEGO

CMC (Code AAP)

COMCARAIRGRU TWELVE

OIC, NPU, El Centro

BUWEPSREP, Dallas

CO, MCAAS, Yuma

1st MAW

3rd MAW

VF-174

VMF-334

VFP-63

VF-24, 51, 91, 111, 154, 191, 211

20 / 2
23
NAVAL SPEEDLETTER

FRR-2138
Ser 5807
15 Sept 1961

To: Commanding Officer (O&R)
Naval Air Station, North Island
San Diego 35, California

REQUEST FOR DIR F8U-2BUNO 146982 STED OUTER WING PANEL AND COMPONENT PARTS

A. FITRON ONE TWO FOUR MSC 142119Z SEPT

B. FONECON H.GREENA NAS NORIS O&R/J. P. GINLEY BUWEPSTLTREADREPPAC

1. SUBJ OUTER WING PANEL AND COMPONENT PARTS WERE DELIVERED BLDG 27 O&R
NAS NORIS, 15 JULY 1961.

2. REQUEST PRI THREE DIR. REF A AND B REFER.

3. ADVISE ALL CONCERNED FINDINGS EARLIEST.

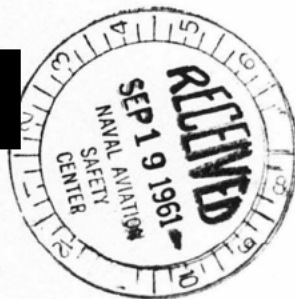
(b) (6)

F8U-2# 146982

Copy to:
FITRON ONE TWO FOUR
COMNAVAIRPAC
COMFAIR SDIEGO
COMCARAIRGRU ONE TWO
→ NAVAVSAFCEN

(b) (6)

By direction



Bureau of Naval Weapons
Fleet Readiness Representative
Pacific
Naval Air Station, North Island
San Diego 35, California

9-9-61
WRITTEN IN LIEU OF A MESSAGE. PLEASE GIVE IT THE SAME CONSIDERATION
AS A RADIO OR TELEGRAPH MESSAGE.

ORIGINAL 1301

PART I - GENERAL

1. A/C ACCIDENT BOARD APPOINTED BY Commanding Officer, Fighter Squadron -124		2. DATE OF ACCIDENT 9 SEP 1961	TIME (LZT) 0904LT	3. SERIAL NUMBER AAR 7-61
4. Commander TO: U.S. Naval Aviation Safety Center		5. ENCLOSURES: (1) Medical Officer's Report (2) Pilots's Statement (3) Flight Leader's Statement (4) 2nd Flight Leader's Statement (5) Wingman's Statement (6) Runway Duty Officer's Statement (7) Helicopter Rescue Report (8) Photos of A/C Damage (A-E) (9) Photos of Wing Locking Assm. (A-C)		
6. VIA: (1) Commanding Officer, FITRON 124 (2) Commander, Carrier Air Group TWELVE (3) Commander, Fleet Air San Diego (4) Commander, U.S. Naval Air Force PacFlt		7. REPORTING CUSTODIAN (if different than item 1. above)		
9. KIND OF FLIGHT 1A6	10. TIME OF DAY <input type="checkbox"/> DAWN <input checked="" type="checkbox"/> DAY <input type="checkbox"/> DUSK <input type="checkbox"/> NIGHT	11. LOCATION OF ACCIDENT Chocolate Mt. Gun Range 311°/14 Mi from Yuma (MAF)		12. ELEVATION ABOVE SEA LEVEL 20,000 ft.
13. PLACE OF LAST TAKE-OFF MCAAS Yuma, Arizona		14. CLEARED: FROM MCAAS Yuma TO MCAAS Yuma		
15. TYPE CLEARANCE <input type="checkbox"/> IFR <input checked="" type="checkbox"/> VFR <input type="checkbox"/> OVR <input checked="" type="checkbox"/> LOCAL <input type="checkbox"/> OPERATIONAL <input type="checkbox"/> AIRWAYS <input type="checkbox"/> DIRECT <input type="checkbox"/> OTHER (Specify)				
16. TIME IN FLIGHT 0+30	17. TYPE ACCIDENT E-4, G-8	18. PHASE OF FLIGHT 4-(IN FLIGHT)		
19. MODEL F8U-2	20. SERIAL NO. 146982	21. DAMAGE TO A/C <input checked="" type="checkbox"/> A <input type="checkbox"/> B <input type="checkbox"/> C <input type="checkbox"/> D <input type="checkbox"/> E <input type="checkbox"/> F	22. DOLLAR COST 1,132,000	23. AIRSPEED (Kts.) 400-420 KIAS
24. A/C WEIGHT 19,800#		25. LIST MODEL, SER. NR, REPORTING CUSTODIAN AND DAMAGE CLASSIFICATION OF ANY OTHER A/C INVOLVED (Complete on OPNAV FORM 3750-1 for each A/C involved) None		

1. NAME (Last, first and middle initials) PILOT (last complete at time of accident) (b) (6)	2. RANK 1st/Lt	3. FILE SER. NO. (b) (6)	4. DESIG. NATOR USMCR	5. BRANCH OR SERVICE (b) (6)	6. AGE 1/4 Yrs.	7. YRS OF EXP. DCA Pilot	8. BILLET Cockpit	9. POSITION E	10. INJURY CODE
CO-PILOT									

PERSONNEL	8. OBT. - OPERATIONAL FLIGHT TRAINER		9. CPT. - COCKPIT PROC. TRAINER		10. UNIT TO WHICH PERSONNEL ARE ATTACHED	11. TYPE INSTRUMENT CARD
	AVAILABLE	USED	AVAILABLE	USED		
PILOT	YES	Yes	Yes	Yes	VF-124	<input checked="" type="checkbox"/> STANDARD <input type="checkbox"/> SPECIAL
NO						
CO-PILOT	YES					<input type="checkbox"/> STANDARD <input type="checkbox"/> SPECIAL
NO						

12. PILOT EXPERIENCE IN HOURS		PILOT	CO-PILOT	ITEM	PILOT	CO-PILOT
ALL MODELS		343.3		CV LANDINGS DAY/NIGHT	12/0	
ALL MODELS IN LAST 12 MONTHS		251.3		FCLP LANDINGS DAY/NIGHT	115/0	
ALL MODELS IN LAST 3 MONTHS		11.7		INSTRUMENT HOURS LAST 3 MONTHS	6.6	
ALL SERIES THIS MODEL (item 19)	A/C	38.8		NIGHT HOURS LAST 3 MONTHS	0	
	OFT / CPT	5/3				
ALL SERIES THIS MODEL LAST 12 MONTHS	A/C	38.8		TOTAL HELO. HRS. (Helo. AAR Only)	NA	
	OFT / CPT	5/3		TOTAL JET HOURS (Jet AAR Only)	303.2	
ALL SERIES THIS MODEL LAST 3 MONTHS	A/C	38.8		LAST FLIGHT, ALL SERIES THIS MODEL	DATE 9/8/61	DURATION 9
	OFT / CPT	5/3				

13. NAME (Last, first and middle initials)	DNA	RANK	FILE/SERVICE NO.	ORG. TO WHICH ATTACHED	INJURY CODE	BILLET	POSIT. ION
1.							
2.							
3.							
4.							
5.							

PAGE 2

1. CEILING Clear	2. VISIBILITY 40	3. RELATIVE WIND (SEE INST'S) 360 (T) REL / 5 KTS	4. TEMPERATURE OAT 79 NA RUNWAY NA	5. DEW POINT 34	6. ALTIMETER SETTING 29.80
7. OTHER WEATHER CONDITIONS (winds aloft, icing levels, sea state, etc. if pertinent to accident)					

✓	FACTOR	✓	FACTOR	✓	FACTOR
	PILOT		LANDING SIGNAL OFFICER	X	MATERIAL FAILURE OR MALFUNCTION
	CREW		OTHER PERSONNEL (Specify)	X	DESIGN
	SUPERVISORY PERSONNEL		ADMINISTRATIVE		ROLLING AND PITCHING DECK/ ROUGH SEAS
	MAINTENANCE PERSONNEL		AIRPORT OR CARRIER FACILITIES	X	UNDETERMINED
	SERVICING PERSONNEL		WEATHER		OTHER (Specify)

FOR ACCIDENTS ABOARD DEPLOYED CARRIER (Complete following Section on Pilot)

1. DATE DEPLOYED NA	2. DAY - HOURS/LANDINGS LOGGED SINCE DEPLOYED	3. DAY - HOURS/LANDINGS LOGGED LAST 30 DAYS
4. INSTRUMENT HRS LOGGED SINCE DEPLOYMENT	5. NIGHT - HOURS/LANDINGS LOGGED SINCE DEPLOYED	6. NIGHT - HOURS/LANDINGS LOGGED LAST 30 DAYS

PART II - MAINTENANCE, MATERIAL AND FACILITIES DATA

1. A/C HISTORY	DATE OF MANUFACTURE	SERVICE TOUR	MONTHS IN THIS TOUR	TOTAL NO OF OVERHAULS	FLIGHT HRS SINCE LAST OVERHAUL	FLIGHT HRS SINCE ACCEPTANCE	TYPE CHECK LAST PERFORMED	FLIGHT HOURS SINCE LAST CHECK	NO. OF DAYS SINCE LAST CHECK
	29 FEB 60	1	17	0 1 PAR	PAR 47.1	664.8	Cal Major	47.1	19
		ENGINE MODEL	ENGINE SERIAL NO						
1	5-20-59	J57 P16	P631149	1	217.5	685.5	Cal Major	47.1	19
2									
3									
4									

a. DID FIRE OCCUR? <input type="checkbox"/> BEFORE ACCIDENT <input checked="" type="checkbox"/> AFTER ACCIDENT <input type="checkbox"/> DID NOT OCCUR		b. DID EXPLOSION OCCUR IN FLIGHT? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO	
c. CHECK IF APPLICABLE <input type="checkbox"/> AMP FOR SERIAL		d. HAS DIR BEEN REQUESTED? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	
e. FAILED COMPONENTS INVOLVED Stbd wing hinge pins & mechanical locking ass.			

CHECK ITEMS PRESENT IN THIS ACCIDENT

a. <input checked="" type="checkbox"/> A/C DESIGN	d. <input checked="" type="checkbox"/> UNDETERMINED	g. <input type="checkbox"/> SURFACE FACILITIES
b. <input type="checkbox"/> A/C EQUIPMENT	e. <input checked="" type="checkbox"/> TECHNICAL INSTRUCTION	h. <input type="checkbox"/> HUMAN ENGINEERING (e.g., Cockpit configurations, etc.)
c. <input type="checkbox"/> MAINTENANCE	f. <input type="checkbox"/> OTHER (Specify) _____	

a. ALTITUDE AT MALFUNCTION 20,000'	b. AIR SPEED 420 Kts	c. OPERATING TEMP Normal	d. WEIGHT OF A/C 19,800#	e. C.G. (% MAC) 29.68%	f. KIND OF FUEL JP-4	g. FUEL PRESSURE Normal
h. EVIDENCE OF FUEL CONTAMINATION None			i. CAUSE OF ENGINE FAILURE OR FLAMEOUT Not applicable			
j. FUEL CONTROL REGULATOR/CARBURETOR (List stock and ser. nos., give time since new or overhauled) 184278-P/N 330416-2 = 47.1 Hours					k. EXTERNAL STORES ABOARD A/C None	

SPECIAL HANDLING REQUIRED IN ACCORDANCE WITH PARA 70, OPNAVINST 3750.6D

AIRCRAFT ACCIDENT REPORT

PART II - MAINTENANCE, MATERIAL AND FACILITIES DATA (Cont'd)

1. GENERAL: ✓ BASIC FACILITIES INVOLVED. DESCRIBE EFFECT ON ACCIDENT IN THE ANALYSIS SECTION OF THE REPORT.

	a. CLEARANCE AUTHORITY		i. WATER LANDING AREA	X	q. CRASH AND RESCUE
	b. FLIGHT PLANNING INFORMATION SOURCE		j. APPROACH ZONE		r. SEARCH AND RESCUE
	c. LANDING AIDS (GCA, CCA, ILS, etc.)		k. END ZONE (<i>Over run</i>)		s. CATAPULT
X	d. TRAFFIC CONTROL TOWER (<i>Field or Ship</i>)		l. SHOULDERS		t. ARRESTING GEAR (<i>Carrier</i>)
	e. APPROACH AND ENROUTE AIDS TO NAVIGATION		m. TAXIWAY		u. BARRIER OR BARRICADE (<i>Field or Ship</i>)
	f. RUNWAY WATCH		n. PARKING AREA		v. FLIGHT DECK
	g. LANDING SIGNAL OFFICER		o. EMERGENCY ARRESTING GEAR (<i>Runway</i>)		w. MIRROR
	h. RUNWAY		p. A/C SERVICING, HANDLING AND DIRECTING (<i>Field or Ship</i>)		x. OTHER (<i>Specify</i>)

a. EQUIPMENT INVOLVED:		<input type="checkbox"/> CATAPULT	b. PRESSURE SETTINGS	c. WIND OVER DECK	d. RELATIVE HEADWIND	e. APPROACH SPEED (SPN - 12 READING)
		<input type="checkbox"/> ARRESTING GEAR				
f. MARK NUMBER	g. MODEL NUMBER	h. LOCATION ON SHIP		i. LAUNCHING BRIDLE AND CONFIGURATION USED		
j. CATAPULT / ARRESTING GEAR BULLETINS OR NOMOGRAMS USED						

K. THIS PORTION SHALL BE COMPLETED WHENEVER (1) A MAJOR AIRCRAFT ACCIDENT INVOLVES ARRESTING GEAR, BARRIER AND/OR BARRICADE EQUIPMENT, OR (2) AN AIRCRAFT ACCIDENT INVOLVES MALFUNCTIONING OF ARRESTING GEAR, BARRIER AND/OR BARRICADE EQUIPMENT. MINOR ACCIDENTS OR ROUTINE DAMAGE TO CABLES, WELDINGS AND OTHER EXPENDABLE COMPONENTS NEED NOT BE REPORTED.

ENGAGED	DECK RUNOUT (FT.)	RAM TRAVEL (IN.)	CONTROL VALVE SETTINGS		ACCUMULAT- OR PRESSURE (PSI)	COMMENTS <i>(for cable failure specify number of landings and months in service)</i>
			CONSTANT PRESSURE			
			DOMESTIC (P.S.I.)	RATIO		
DECK PENDANT						
DECK PENDANT						
BARRIER						
BARRIER						
BARRICADE						

PART	SECTION	ITEM	PART III REMARKS (Continue on additional sheets)	COPY DISTRIBUTION
I	A	5	(10) Wing Spread Sequence Valve DIAGRAM (11) Statements concerning Wing Locking Sequence (12) Maintenance Officer's Statement <u>Dist. Cont'd</u> lcc VF-174 lcc VMF-334 lcc VFP-63 lcc VF-24, 51, 91, 111, 154, 191, 211	ZCC NAVAVSAFEEN DIRECT ICC BUWEPS DIRECT lcc CINCPACFLT lcc COMNAVAIRPAC lcc COMFAIRSDIEGO lcc CMC (Code AAP) lcc COMCVG TWELVE lcc CinC. NPU, El lcc BUWEPSREP, Dall lcc CO MCAAS Yuma lcc 1st. 3rd MAW
COST DAMAGE TO:			GOVERNMENT PROPERTY None	DATE SUBMITTED TO C.O. 28 Sep 1961
			PRIVATE PROPERTY None	

PART IV - SIGNATURES OF THE BOARD			
SENIOR MEMBER	(b) (6)	MEMBER	(b) (6)
VF Training Officer	(b) (6)	UNIT SILENT	(b) (6)
FLIGHT SURGEON MEMBER	(b) (6)	MEMBER	(b) (6)
(b) (6)	(b) (6)	UNIT SILENT	(b) (6)

SPECIAL HANDLING REQUIRED IN ACCORDANCE WITH PARA 70, OPNAVINST 3750.6D

THE ACCOUNT

PART V - THE ACCIDENT

At 0831 local on 9 September 1961, 1/LT (b) (6), flying F8U-2 BUNO 146982 (Modex 404), took off from MCAAS Yuma, Arizona on a scheduled gunnery flight as #2 in a flight of 4. Following completion of approximately 9 gunnery runs at 20,000, the pilot started the next pass from what he thought was a normal perch position. The run developed into an acute angle-off situation so he decided to discontinue the run, and in doing so passed behind the banner (approximately 1200 feet 420 KIAS) with approximately 4G's. As he passed through the slip stream of the tow aircraft he was flipped into a series of violent right hand cork-screw horizontal turns, which developed into a vertical rolling dive. The pilot reduced power to idle and following the third turn was convinced he was in a spin, so started spin recovery technique by blowing the leading edge droop down. Following approximately $4\frac{1}{2}$ to $5\frac{1}{2}$ right turns the aircraft hesitated, then started into a left hand corkscrew motion for an additional two turns before the pilot effected recovery in a 100° nose down attitude at approximately 550 KIAS. Full recovery to level flight was accomplished at 4000' indicating 350 KIAS.

The pilot commenced climbing then slowed to 300 KTS because of an unstable feeling that he thought was caused by the leading edge droop being down, and noticed he had lost utility hydraulic pressure. He adjusted the side mirrors and noticed the right hand leading edge droop and complete outer wing panel were missing. (See enclosure 2) He continued climbing and while passing through 6,000' was joined by the flight leader who had maintained visual contact from the time right after he entered the corkscrew maneuver. The flight leader informed (b) (6) he had lost the RH inboard leading edge droop, outer wing panel, RH ventral fin, and suggested slow flight. (See enclosure 3) At 10,000 he attempted slow flight but was unable to maintain positive control below 250 KIAS. He continued climbing, heading for Yuma. LCDR (b) (6) flight leader for the 2nd flight, was airborne at the time of the accident and joined 1/LT (b) (6) and LT (b) (6) near Yuma, and assisted in the controlled ejection at 20M south of Yuma near aux #2. (See enclosure (4), (5), & (6)) The pilot ejected at 20M 250 KIAS, in a right bank. LCDR (b) (6) followed the aircraft to impact while LT (b) (6) kept the pilot in sight. At 11,000' the chute deployed. LCDR (b) (6) returned to the area of the pilot, and relieved LT (b) (6) who had a low fuel condition. The rescue helicopter at MCAAS Yuma had been alerted approximately 10 min. prior to ejection and was directed to the scene by the Yuma tower. The pilot was observed descending in the parachute and subsequent pick up was made at approximately 0930 local. (See enclosure 7).

PART VI - DAMAGE TO AIRCRAFT

The following aircraft sections of F8U-2 BUNO 146982 were lost or damaged on inflight phase of this accident:

- a. Starboard outer wing panel including its leading edge droop.
- b. Starboard center section leading edge droop.
- c. Starboard ventral fin.
- d. Scratches and breaks in starboard fuselage skin.

The entire starboard outer wing panel, including the outer panel leading edge droop, was broken off at the wingfold area while the aircraft was in a gunnery run at 20,000 feet. Sometime during the vertical violently rolling dive the starboard center section leading edge droop tore away from the aircraft, rolled under the wing and inflicted an arc of scratches and breaks in the starboard fuselage skin in the area just below the wing leading edge. When the center section droop went under the wing it hit and carried away the starboard ventral fin. Utility hydraulic pressure was reduced to 500 pounds during the uncontrolled flight and shortly after recovery dropped to zero.

After the pilot ejected at 20,000 feet, the aircraft assumed a vertical right corkscrew motion and struck the ground in a near vertical attitude. The aircraft exploded upon impact and sustained strike damage. See enclosures 8A through 8D for view of impact area and location of larger pieces of wreckage.

Parts of the starboard wing (enclosure 8E) the wing fold mechanisms, and the droop cylinders, which were located, were turned into O and R Noris for DIR. (See enclosures 9A thru 9C and part VII - INVESTIGATION for complete list of parts). The remainder of the aircraft was deemed not salvageable and was released to 11th Naval District for disposition.

PART VII - THE INVESTIGATION

Investigation by the Board included review of the pilots' and witnesses' statements, interrogation of the pilot and witnesses, search for all aircraft parts considered significant, inspection of all significant parts recovered, study of the F8U wing folding and locking system, extensive empirical testing of the wing folding and locking system on squadron aircraft, review of the maintenance history of BUNO 146982, and a visit to O&R North Island, San Diego, California.

It was determined that 1st LT (b)(6) was on a duly authorized flight, for which he was properly briefed and fully qualified. The flight progressed in a normal manner until approximately the 9th gunnery run, at which time the events transpired as described in PART V - THE ACCIDENT.

The gunnery banner utilized on this flight was recovered normally, and showed no evidence of aircraft contact.

A search of the Chocolate Mountain gunnery range was commenced to locate the parts that separated from the aircraft in flight. As the result of this search, the following parts were found and recovered.

(1) Starboard outer panel wing and droop - see enclosure (8D)

(2) Starboard center section droop, broken into two pieces with the outboard actuating cylinder attached and the inboard actuating cylinder missing.

(3) Starboard ventral fin, broken into three pieces, with about one foot of the forward end missing.

It is apparent from the fact that the droop and ventral fin were located 13,000' further along the flight path of the aircraft (approx. 050° MAG), that initially the starboard outer wing panel departed, causing the uncontrolled right rolling maneuver described by the pilot and witnesses. The starboard center section droop panel subsequently left the aircraft as the emergency landing droop was extended.

A thorough search of the impact area yielded the following parts.

(1) Starboard aft, wing hinge pulling cylinder assembly, with a portion of the starboard center section rib assembly attached. (See enclosure (9c)). See enclosure (9A) which shows the assembly in relation to the matching portion of the starboard outer wing panel rib assembly.

(2) Starboard forward wing hinge pulling assembly with a portion of the starboard center section rib assembly attached. See enclosure (9B), which shows this assembly in relation to the matching portion of the starboard outer wing panel rib assembly.

(3) Starboard wing spread sequence valve assembly case. The plunger and all internal portions of the valve assembly were missing, and not subsequently recovered.

(4) Port wing spread sequence valve assembly, which was recovered intact. The valve was subsequently disassembled, revealing no evidence of malfunction.

(5) A piece of the starboard aft wing hinge pin safety latch. There was no apparent evidence of malfunction.

(6) A portion of the port center section wing fold rib with a portion of the port outer wing panel rib held in place by the hydraulic hinge pins. The hinge pins were fully home with pieces of the mechanical locking mechanism still in place.

(7) A portion of an inboard center section droop actuator, too badly damaged to determine if it was port or starboard.

(8) Both wing fold actuating cylinders, too badly damaged to reveal any evidence of abnormal operation.

(9) Wing fold solenoid sequence valve, too badly damaged to reveal any evidence of abnormal operation.

(10) Several bits and pieces of the starboard mechanical locking mechanism, all too badly damaged to reveal any evidence of malfunction.

The starboard outer panel wing and droop, the starboard center section outboard droop actuating cylinder, and significant parts recovered from the impact area (items 1,2,3,5 and 6 listed above) were forwarded to O&R NAS North Island for D.I.R.

Of particular interest was the starboard outer wing panel hinge area. When the two hinge pin pulling cylinder assemblies recovered from the impact area were mated to their appropriate positions on the outer panel, it was obvious that the wing hinge pins were extended only through the first outer panel lug in each case. (See enclosures (9A) & (9B)). Impact forces upon aircraft contact with the ground is the only logical explanation for the additional travel of the hinge pins.

At this point, the Board directed its efforts toward obtaining answers to the following two (2) questions.

(1) Why were the wing hinge pins only partially extended?

(2) With the pins only partially extended, why did the wing hinge pin manual locking system fail to indicate this condition?

A review of the maintenance history of the aircraft since squadron acceptance, revealed no evidence of previous wing folding, spreading or locking discrepancies.

In answering the first question, consideration of the nature of the partial wing hinge pin extension pointed to the wing spread sequence valve as the prime suspect. The rigging of the wing spread sequence valve 1008463 or 1008463-1 as stated in the HMI page 261 para #1179 is as follows:

- (a) Removed aft pin pull cylinder access panel
- (b) Loosen locknut and turn sequence valve adjusting bolt all the way into valve
- (c) Connect external hydraulic power
- (d) Spread wings if folded
- (e) With hydraulic power on, turn adjusting bolt out until it contacts outer wing panel bracket and wing hinge pin extends
- (f) Turn adjusting bolt out one full turn, tighten and safety locknut
- (g) Manually push bolt in until it is bottomed and check for 0.05 inch minimum clearance between bolt-head and bracket

An investigation was conducted on the operation of the sequence valves of two different aircraft on the VF-124 line. Referring to enclosure (10), it can be seen that during the spread sequence, plunger "A" has to be depressed by striker plate "B", unseating the spring loaded ball check valve, before fluid can flow to the wing hinge pin actuating cylinders. Tests showed that after the completion of step (e) of the rigging instructions listed above, between $\frac{1}{4}$ and $\frac{3}{4}$ turn-in of the adjusting bolt would allow the wing hinge pins to go only partially home. To be more specific, the pins extended approximately three inches each, progressing only through one forward and one aft lug on the outer wing panel. Further test showed that the difference in displacement of plunger "A" required for complete operation and partial operation of the wing hinge pins resulted from $\frac{1}{3}$ to $\frac{1}{2}$ turn of the adjusting bolt. One half turn of the adjusting bolt is equal to .0178 inches. As stated in step (f) of the rigging instructions listed above, one more full turn-out (.0357 inches) is required for correct rigging. In other words, the approximate overall displacement for proper rigging would be .0535 inches as a minimum, from the time the ball is displaced by plunger "A".

If the system possessed overall mechanical rigidity, this tolerance would not be of particular concern. However, such is not the case. There are factors present in the system which tend to reduce the tolerance merely as the result of normal operation. An elongated, concave depression develops in the outer wing panel striker plate as the result of contact with the adjusting bolt during repeated folding and spreading of the wings. The average striker plate depression on VF-124 F8U-2 aircraft was found to be .012 inches. In addition, the striker plates are painted surfaces, and if the sequence valve is rigged with the paint still present, subsequent wearing off of the paint further reduces the displacement of the sequence valve plunger.

The mechanical rigidity of the system is further reduced by the support panel to which the striker plate is mounted. A very noticeable "oil canning" is produced by moderate thumb pressure on the striker plate. This was found to be of considerable significance.

When the spring loaded ball check valve is unseated, hydraulic pressure acts against the internal surface area of the plunger attempting to force the plunger out. This force is transmitted to the striker plate and its support panel which "oil cans" or gives way. This "oil canning" movement is very noticeable in the opposite direction when sequence valve internal hydraulic pressure is relieved by selecting the wings folded position in the cockpit. With sufficient misrigging of the adjusting bolt this mechanical give in the system causes the spring loaded ball check valve to re-seat, stopping the flow of hydraulic fluid to the wing hinge pin actuators. The re-seating of the ball is evidenced by a noticeable chattering noise. With a hydraulic pressure gauge installed between the sequence valve and the wing hinge pin actuators, a rapid pressure fluctuation was observed while the chattering noise was evident, followed by a drop to 0 pressure as hinge pin movement, and the chattering noise, ceased.

Of interest is the fact that following original rigging of the wing spread sequence valve and adjusting bolt, no periodic check or readjustment is required during the service life of the aircraft unless either a malfunction of the system is discovered, or components of the system are replaced.

Two additional factors contributing to reduced system integrity are considered worthy of mention.

(1) The locknut on the adjusting bolt cannot be effectively safety wired to the plunger in the present configuration. This leaves the locknut free to work loose. The present system of safety wiring the bolt as an attempt to safety the locknut still permits some turning in either direction.

(2) The plunger is free to rotate in its mounting. If a tight thread fit exists between the adjusting bolt and the plunger, the possibility exists that during rigging as set forth in paragraph (f) of the HMI, the plunger may be inadvertently turned with the adjusting bolt.

To answer why the wing hinge pin manual locking system failed to indicate incomplete extension of the wing hinge pins, two factors are considered plausible.

(1) Failure of the pilot, during the wing folding cycle, to rotate the cockpit wing locking lever fully aft into the detent.

(2) A malfunction of, or misrigging in the wing hinge pin lock control system.

Investigation of the first possibility (See enclosure (11)) began with interrogation of LTJG (b) (6) the pilot of BUNO 146982 on the previous flight, who revealed that he definitely recalls placing the locking lever to the fully aft detent position, feeling it click into place prior to folding the wings. Interrogation of 1st LT (b) (6) revealed that after the aircraft was started he placed the locking lever fully down to the locked position, utilizing his normal procedure of first squeezing the lever end to disengage it from the detent. The forces associated with the movement of the wing locking lever seemed to him to be completely normal. It is his belief that the wing locking lever was fully aft prior to this action. He then observed

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that the wing lock warning flags were not visible, and observed the plane captain push up on each wing tip as a check for hinge pin extension. (This is squadron standard operating procedure. If the hinge pins fail to extend, approximately 100 pounds of upward force on the wing tip will cause utility system pressure to the wing fold spread actuator to bypass and the outer wing panel will visibly move toward the folded position.) Interrogation of (b) (6) AN, USN, plane captain of BUONO 146982 revealed that he observed that the warning flags were not visible, and that he performed the hinge pin extension check, as described above, on both wing tips.

In the operational history of the F8U, one previous accident involving malfunction of the wing fold/lock system is known to the members of the Board. This accident, VF-211 AAR 2-59, involving an outer panel folding on take off, prompted BUAER msg 062148Z of March 1959 which specified procedures for checking the rigging of the wing manual locking systems. Subsequently, F8U Aircraft Service Change No. 303 was issued. Significant portions of this service change are quoted below.

"PURPOSE: To eliminate an unsafe condition due to partial actuation of the wing hinge pin lock control handle or misrigging. It is possible to trap the lock plungers with the latch which will permit subsequent operation of the lock mechanism even if the lock pins are not in place.

DESCRIPTION OF INSTALLATION: This change involves removing .08 inch from the lip of the wing hinge pin lock hatch. This cut provides release of the spring loaded lock plunger at an earlier point in the wing hinge pin lock cockpit control handle travel, thereby reducing the probability of trapping the spring loaded lock plunger behind the lock latch. The plungers are installed to prevent actuation of the lock handle in case all of the lock pins are not home. If the plungers are trapped by the latch an unsafe condition can exist."

As is pointed out above, the probability of trapping the spring loaded lock plungers behind the lock latches still exists. Empirical tests of the wing lock mechanism were conducted on over half of VF-124's aircraft. These tests showed:

(1) The aircraft were all properly rigged.

(2) In every case, the cockpit wing locking lever could be positioned to permit completely free movement of the wing spread/fold lever, with resulting free movement of the hydraulic hinge pins, without the locking latches having released any of the spring loaded plungers. In this condition, all safety features of the wing lock mechanism are completely negated.

It is noted that none of the F8U flight handbooks emphasize the necessity for ensuring full aft travel of the cockpit wing locking lever.

The condition as stated in item 2 above can also be achieved with the wing hinge pin lock cockpit control handle in the full aft detent position, any time the mechanical linkage between the cockpit and the wingfold area is sufficiently out of rig.

Inspection of the maintenance records of the BUNO 146982 revealed that ASC 303 had been incorporated by the contractor prior to delivery of the aircraft to VF-124, and that the provisions of BUAER msg 062148Z of March 1959 had been complied with. (See enclosure (12)) The inspection procedures set forth in the BUAER msg were last accomplished at O&R North Island, San Diego, during a scheduled PAR period. The aircraft was received from PAR on 22 August 1961, and the accident occurred on the 42nd subsequent flight. It is estimated that the wings were folded during normal operations, a minimum of 8 times during this period.

Preliminary D.I.R. information indicates the strong possibility that the hinge pins had been only partially extended on at least several previous flights.

The accident Board visited O&R North Island. The pertinent worksheets on BUNO 146982 were reviewed, and no discrepancies were noted. The members of the Board inspected the F8U PAR line, and witnessed a demonstration of the wing manual locking system check. There was no evidence of improper procedures. It is noted, however, that if the manual locking system is found to be out of rig, and is subsequently re-rigged, no written record of this fact will appear. Also, after this check is performed, as the aircraft progresses through the PAR program, work may be performed in areas in which portions of the manual locking system linkages and cables are located.

PART VIII - THE ANALYSIS

In analyzing this accident, it is readily apparent that a dual material malfunction occurred. The hydraulic wing hinge pins did not fully extend, and the wing hinge pin lock system failed to indicate this unsafe condition.

a. Personnel Factors: Wing locking technique is not considered to be a factor in this accident. LTJG (b) (6) is positive of his action of placing the wing locking lever in the fully aft detent position. Once this has been accomplished during the wing fold cycle, the pilot has done all he can to ensure the incorporation of the safety features provided by the present wing hinge pin manual locking system.

The fact that 1st/LT (b) (6) interpreted his maneuver as a spin, and selected emergency landing droop as a corrective measure, can only be regarded as a normal reaction considering his experience level in the aircraft, and the fact that he has never been in a spin in the F8U. In fact, considering the violence of the maneuver, it is noteworthy that he succeeded in accomplishing what most pilots have failed to accomplish in F8U spinning maneuvers. It is highly probable that the separation of the starboard center section droop from the aircraft, as the droop was blown, is the main reason 1st/LT (b) (6) succeeded in recovering the aircraft. The resulting difference in angle of attack of the two wings apparently provided the margin of control needed. It is the opinion of the board that the pilot handled his emergency situation from beginning to end, in a thoroughly professional manner.

b. Supervisory Factors: There are no supervisory factors regarding pilot instruction or training.

There were no wing folding or locking discrepancies on this aircraft. Aircraft Service Change No. 303 was incorporated and inspection of the wingfold hinge pin lock mechanism as directed by BUAER message 062148Z of March 1959 had been performed by VF-124 on each periodic inspection. This inspection was last accomplished by O & R North Island, San Diego, California. Inspection of the PAR worksheets, and observance of O & R procedures while performing the above inspection, revealed no discrepancies. However, as is pointed out in the investigation, no written record will appear if the system is found to be out of rig, and is subsequently re-rigged. Also, work may be subsequently performed in areas in which portions of the manual locking system linkages and cables are located, and the possibility exists that inadvertant misrigging may result. Unfortunately, the board was unable to gather any concrete evidence tending to support or dispel the possibility of misrigging of BUNO 146982.

As was noted in the investigation, the present provisions of the HMI regarding the rigging of the sequence valve, specifically state that the locknut is to be safetied following rigging. The locknut does not have, nor to the knowledge of the board has it ever had, the capability of being effectively safety wired. The board was unable to discover a logical explanation for this discrepancy.

c. Material Failure or Malfunction: The failure of the wing hinge pins to fully extend was the primary factor causing the outer wing panel to separate from the aircraft during flight. The fact that the separation occurred on this gunnery run, vice one of the previous eight, can be attributed to gust loads imposed on the outer panel while flying through the tow aircraft's slip stream. The pilot stated that he had been pulling approximately 4 G's on all runs.

Malfunction of the wing spread sequence valve is considered to be the reason the wing hinge pins did not fully extend. As was brought out in the investigation, a minute difference in plunger travel makes the difference between partial and complete operation of the sequence valve. The following factors are always present which tend to further reduce this already minimal dimension.

(1) The continuous wearing of a concave depression in the striker plate as the result of contact with the adjusting bolt during the wing fold/spread sequence.

(2) "Oil canning" or give in the striker plate and bulkhead to which it is attached.

(3) The locknut on the adjusting bolt cannot be safety wired to the plunger, and is thus free to work loose.

(4) The sequence valve plunger is free to rotate in its mounting. A tight thread fit between the adjusting bolt and the plunger may cause the plunger to be inadvertently turned with the adjusting bolt during the rigging process.

A contributing factor in this accident was the failure of the wing hinge pin lock system to indicate that the hinge pins were not fully extended. As was pointed out in the investigation, a history of previous locking malfunctions in the F8U prompted issuance of BUAER message 062148Z of March 1959 and ASC 303 dated 10 February 1960. ASC 303 was incorporated on BUNO 146982, and the provisions of the BUAER message had been complied with. The investigation has also shown that in spite of compliance with these directives, it is still possible for the pilot to receive an indication that would lead him to believe that the wing locking system had operated satisfactorily, when in reality a malfunction was present.

It is the opinion of the board that this situation existed in BUNO 146982 as the result of one or more of the following factors.

(1) Inadvertant mis-rigging of the manual locking system after the last operational check was performed.

(2) Normal wear or stretch of the cables and linkages causing enough slack in the system to permit the spring loaded plungers to be retained by the locking latches with the cockpit wing locking handle in the full aft position.

(3) The procedure for checking the locking system as set forth in BUAEER message 062148Z, not being complied with to the fullest extent.

Positive evidence pointing to any of the above factors was not discovered in this accident. However, preliminary DIR information indicates that the wing hinge pins had been only partially extending for some time. It is known that the wings of BUNO 146982 had been folded at least eight times since the last major inspection by O & R North Island. It is the opinion of the board that the wing lock control system was, in all probability, out of adjustment for this entire period.

d. Facilities: All the functions of MCAAS Yuma that relate to this accident were performed in an expeditious and professional manner. There are no cause factors or discrepancies under facilities. HMR-462 provided assistance in the search for and return of aircraft parts.

c. Personnel safety equipment: The pilot was wearing all the prescribed items of flight gear. The only personal equipment utilized was a day flare, which the pilot used to signal his position to the rescue helicopter. Even though the helicopter crew had the pilot in sight, the flare did provide assistance in determining wind direction.

The pilot released his two lower rocket jet fittings and allowed the liferaft/survival pack to fall free. This was in accordance with previous squadron training to prevent possible leg injury on landing. The pack did fall from a height that damaged the PRC-17.

A Martin-Baker F-5 seat was installed and functioned normally. One point of interest was that the drogue piston was swinging back and forth in close proximity to the pilot's head during the parachute descent. He caught and held the drogue piston on two different occasions. Mr. Basil McNAB, West Coast Martin-Baker Representative, revealed this had happened on other occasions. However, no one had ever been injured by the drogue piston, plus the drogue withdrawal line had to be its present exact length for the system to function properly. On previous high altitude tests the pilots cut off the piston with a survival knife when it bothered them.

PART IX - COMMENTS:

The two cause factors of this accident were:

A. Failure of the starboard wing hinge pins to complete full travel.

B. Failure of the wing hinge pin lock controls to indicate an unsafe condition.

It is the opinion of the board that the reason the wing hinge pins did not complete full travel was due to a malfunction of the starboard wing spread sequence valve as discussed in the investigation and analysis. Had a requirement existed to check the adjustment on the wing spread sequence valve periodically, the probability of this accident occurring would have been lessened considerably. The failure of the wing hinge pin lock controls to indicate the unsafe condition stated above, can be attributed to either improper rigging, or normal wear/stretch of the system on the starboard side to allow an out of rig situation to develop.

The present wing hinge pin lock system, even with ASC 303 incorporated is considered to be unsatisfactory from a design stand point, in that the system can indicate proper wing hinge pin operation, when in fact an unsafe condition exists. It is felt that corrective measures should be directed toward the design of an indicating system directly dependent upon wing hinge pin action, rather than toward further modification of the existing wing hinge pin lock installation.

PART X - RECOMMENDATIONS

1. Revise HML NAVAER 01-45HHC-2-3 as follows:

a. Paragraph 1179, subparagraph (e.) With hydraulic power on, turn adjusting bolt out until it contacts outer wing panel bracket and wing hinge pin extends fully. Check extension as per FIG 1114 steps 24 and 25.

b. Paragraph 1179, subparagraph (f.) Turn adjusting bolt out TWO full turns, tighten and safety locknut. NOTE: Insure that sequence valve plunger does not rotate while adjusting bolt is turned.

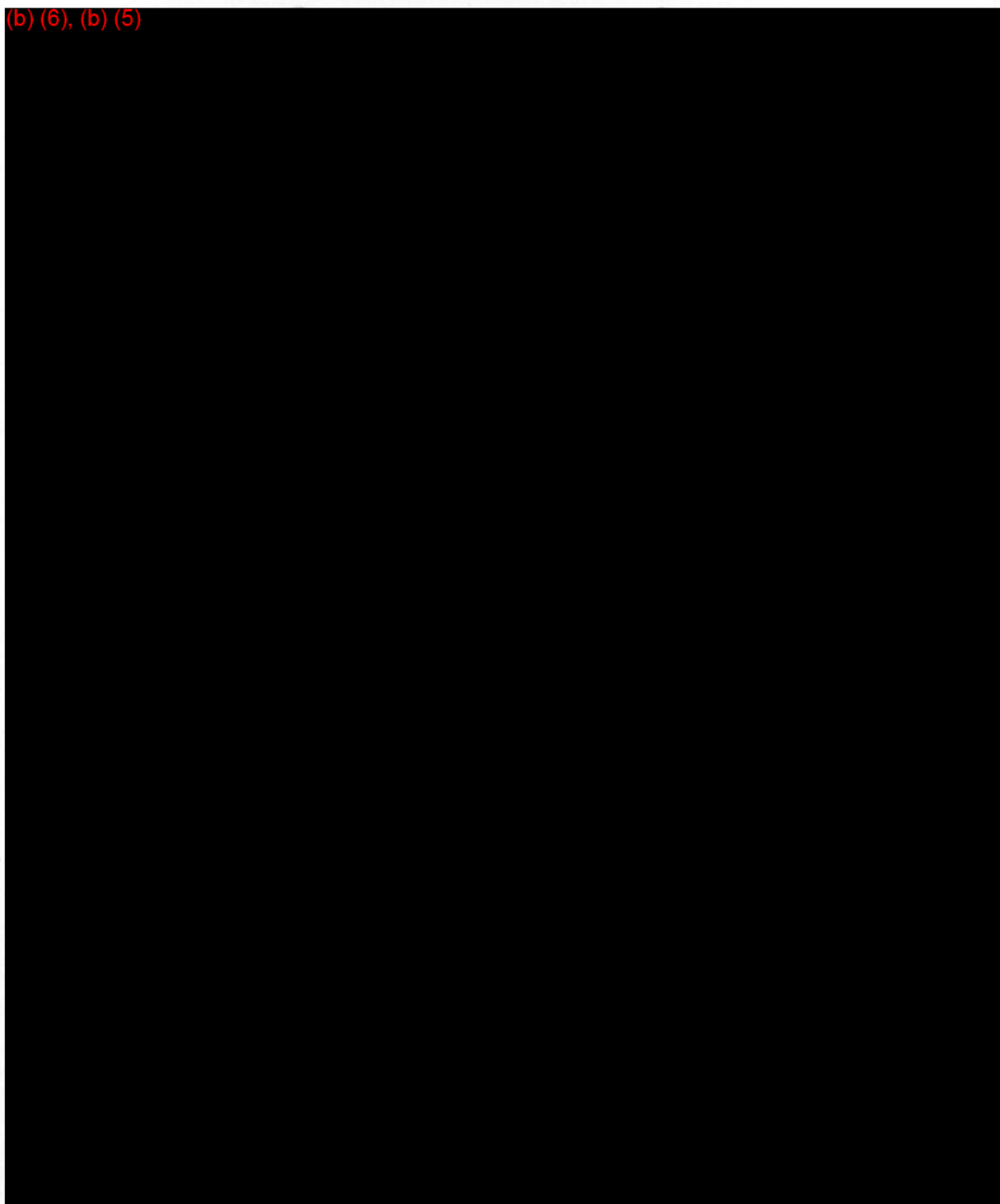
2. The locknut on the adjusting bolt of the wing spread sequence valve be modified to permit effective safety wiring to the plunger.

3. Inspect and re-rig the setting of the wing spread sequence valve on each aircraft calendar major inspection.

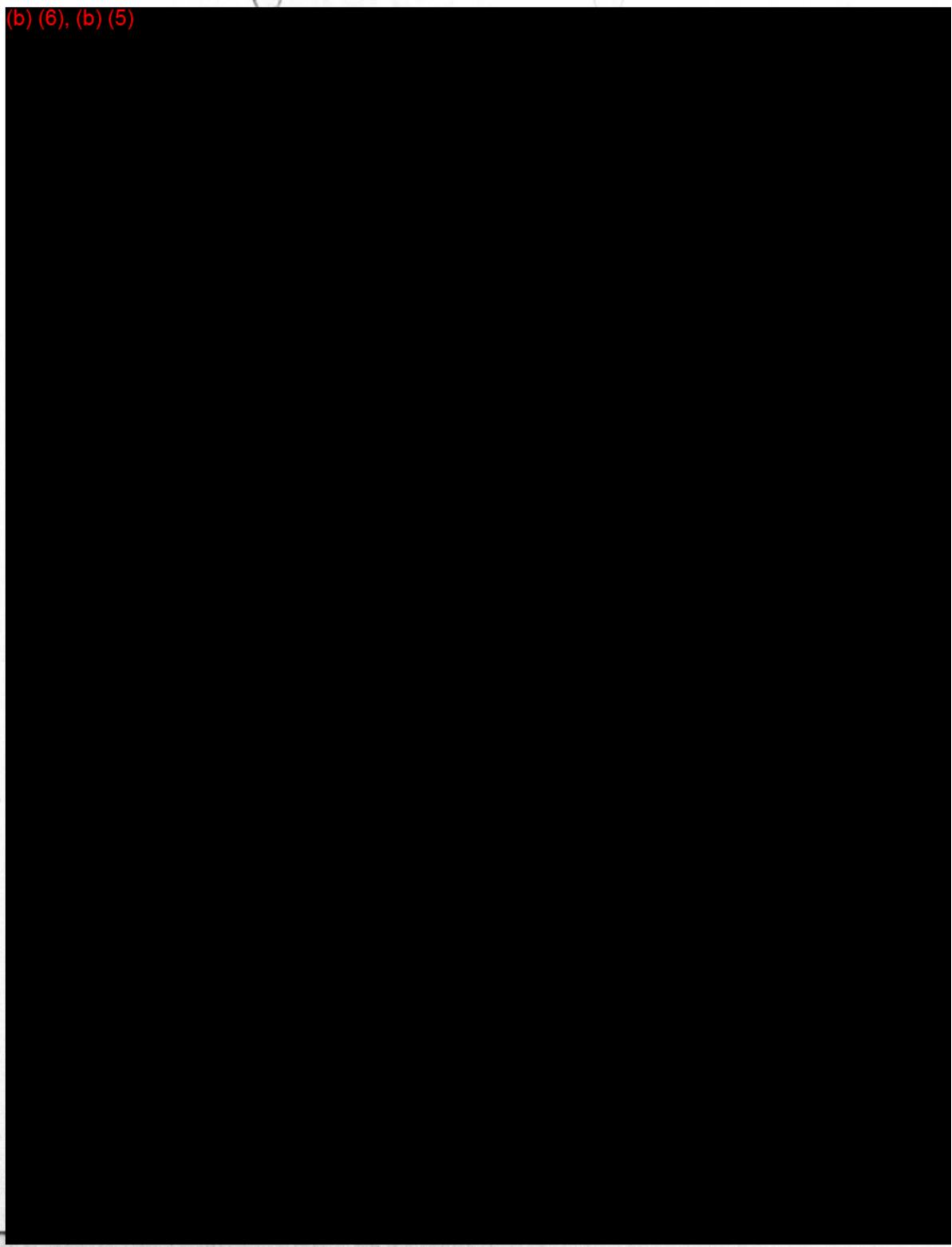
4. Revise the F8U flight handbook to emphasize the necessity for placing the cockpit wing lock control lever into the fully aft detent position.

5. A device be developed that will provide a positive visual indication that the hydraulic wing hinge pins have fully extended. To do so adequately, the indication must be as a direct result of wing hinge pin movement. The indication could be warning flag movement at the wing fold area. Even more desirable would be a warning light in the cockpit, dependent upon micro-switch actuation at full travel of the wing hinge pins, providing both day and night indication directly to the pilot.

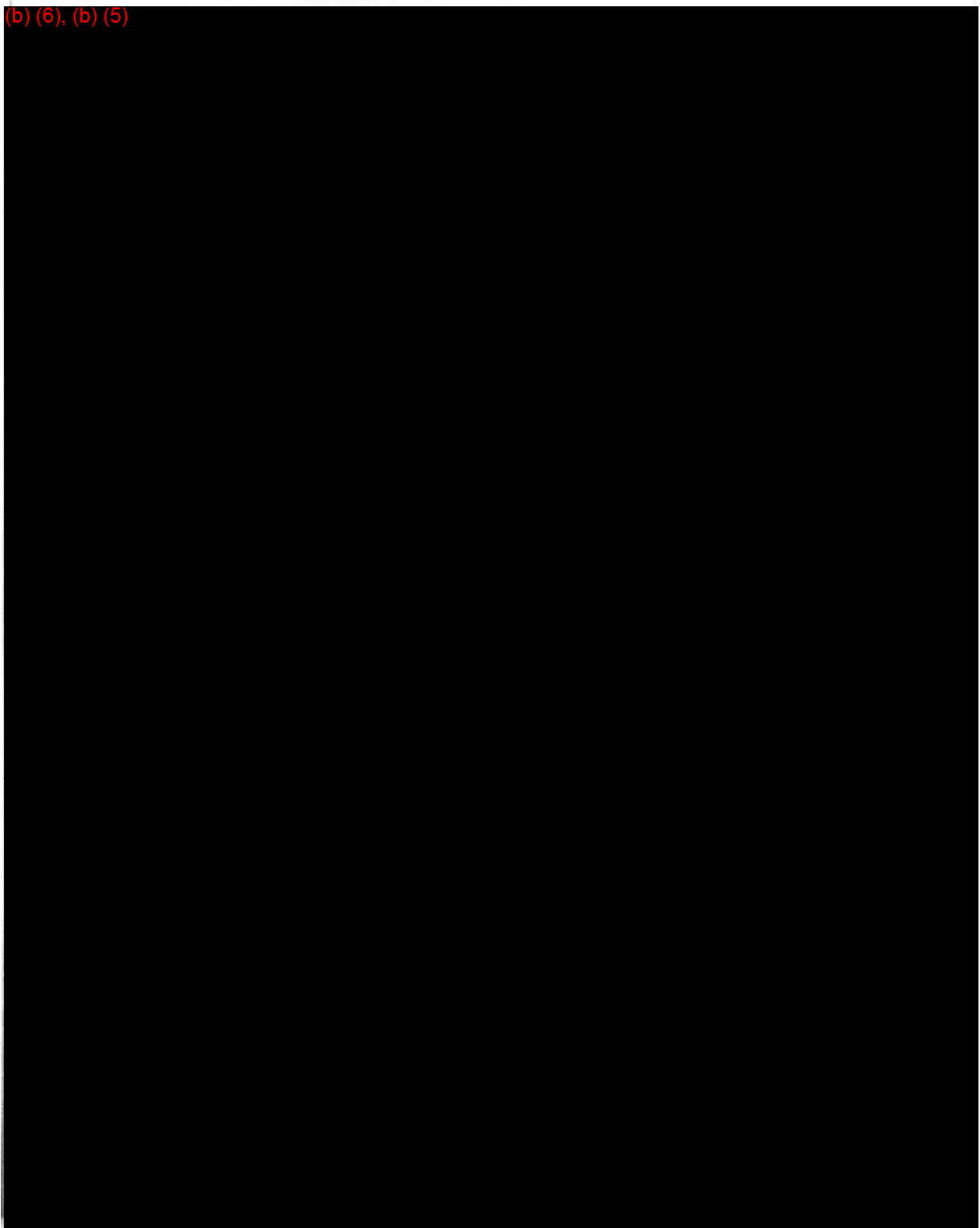
(b) (6), (b) (5)



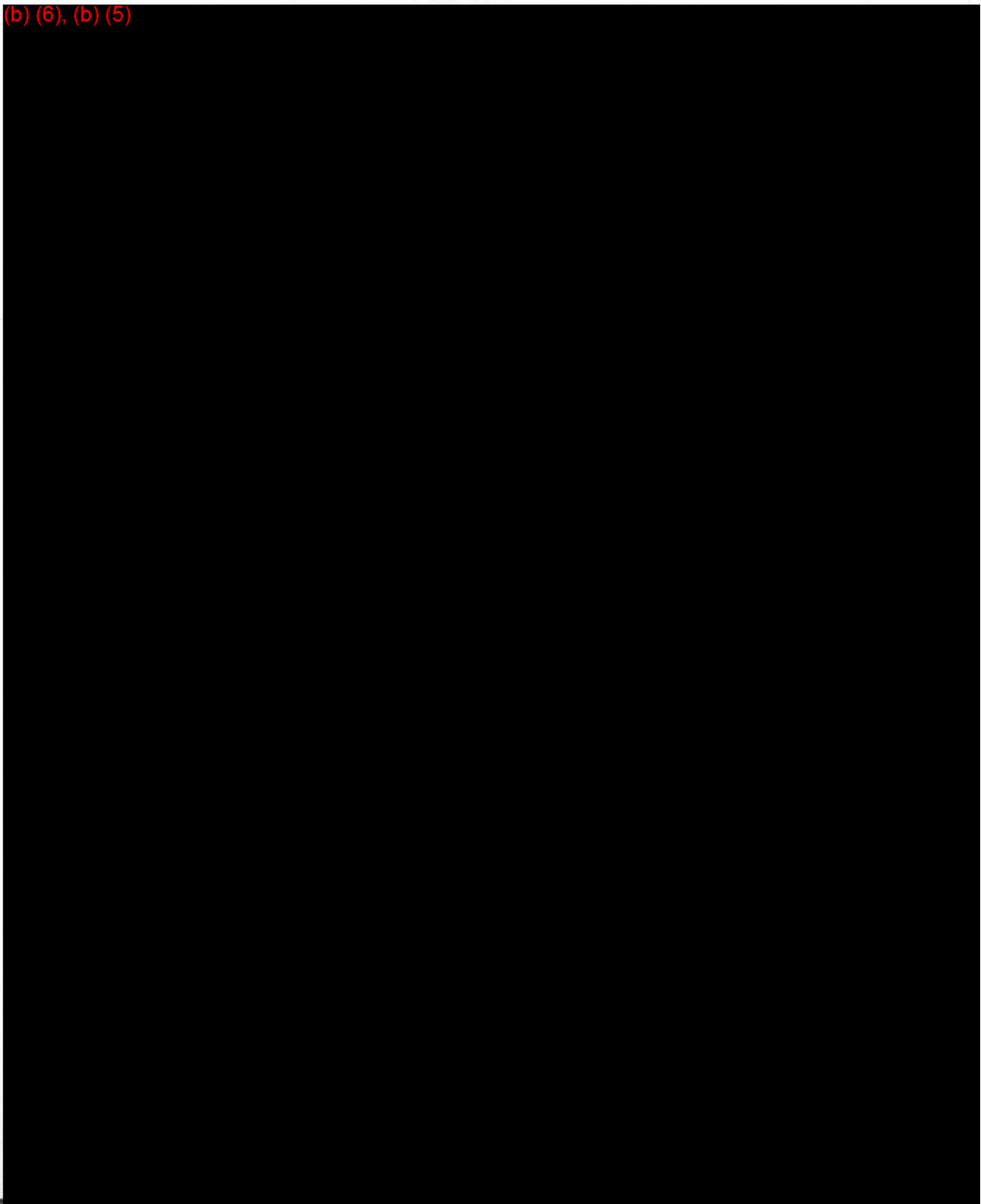
(b) (6), (b) (5)



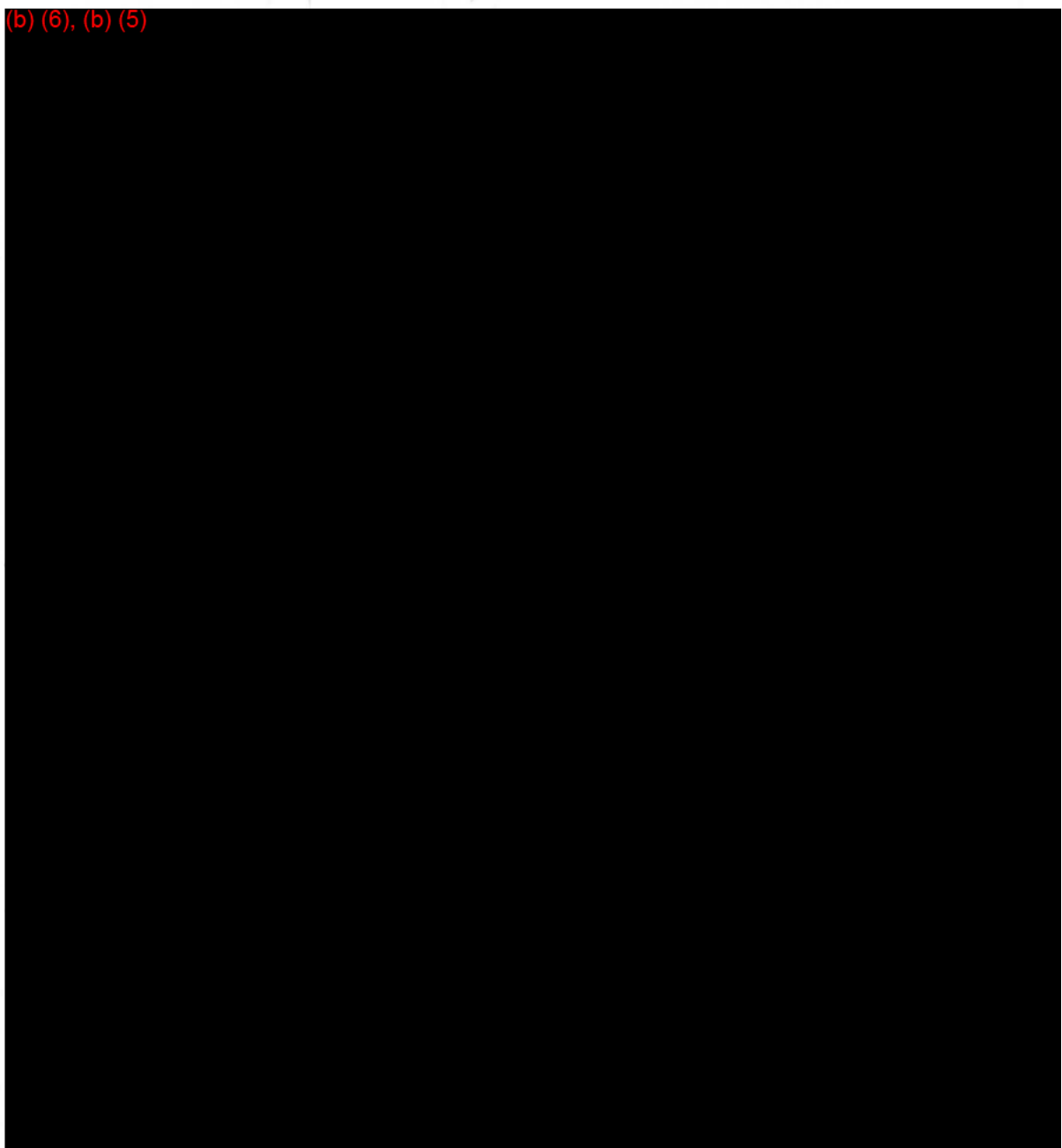
(b) (6), (b) (5)



(b) (6), (b) (5)



(b) (6), (b) (5)



SPECIAL HANDLING REQUIRED IN ACCORDANCE WITH PARA 70, OPNAV INST 3750.6D

Support
Panel

Adjusting
Bolt.

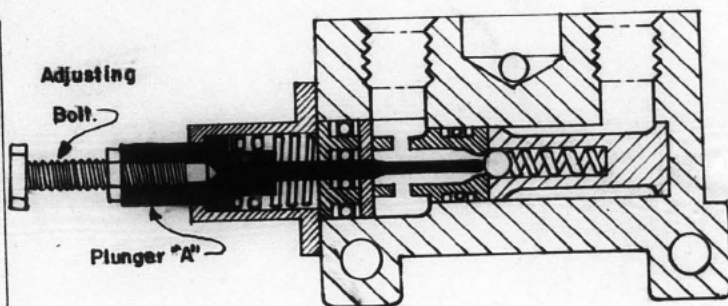
Plunger "A"

Striker Plate "B"

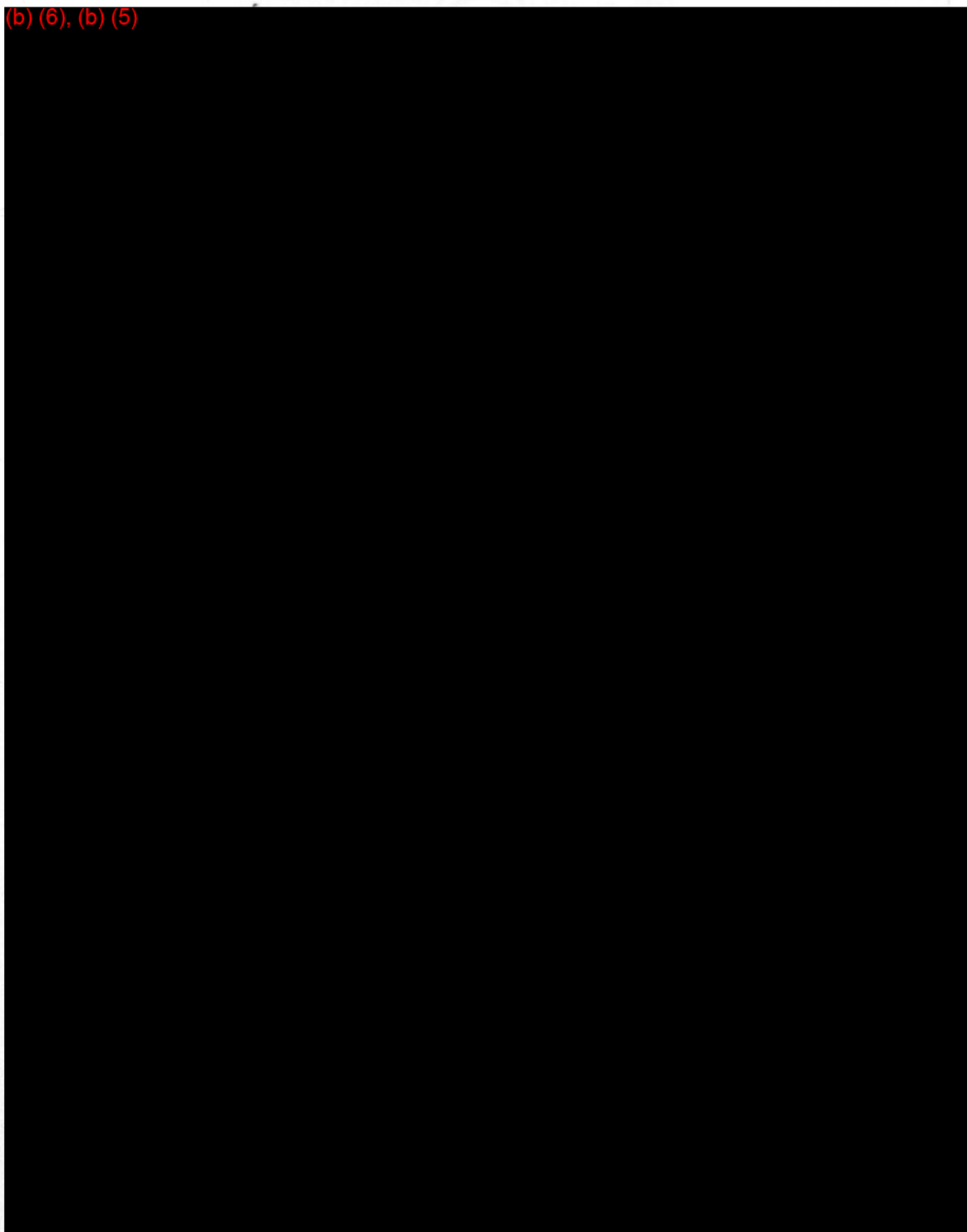
Hydraulic fluid flow while
wing hinge pins are being
extended.

WING SPREAD SEQUENCE VALVE

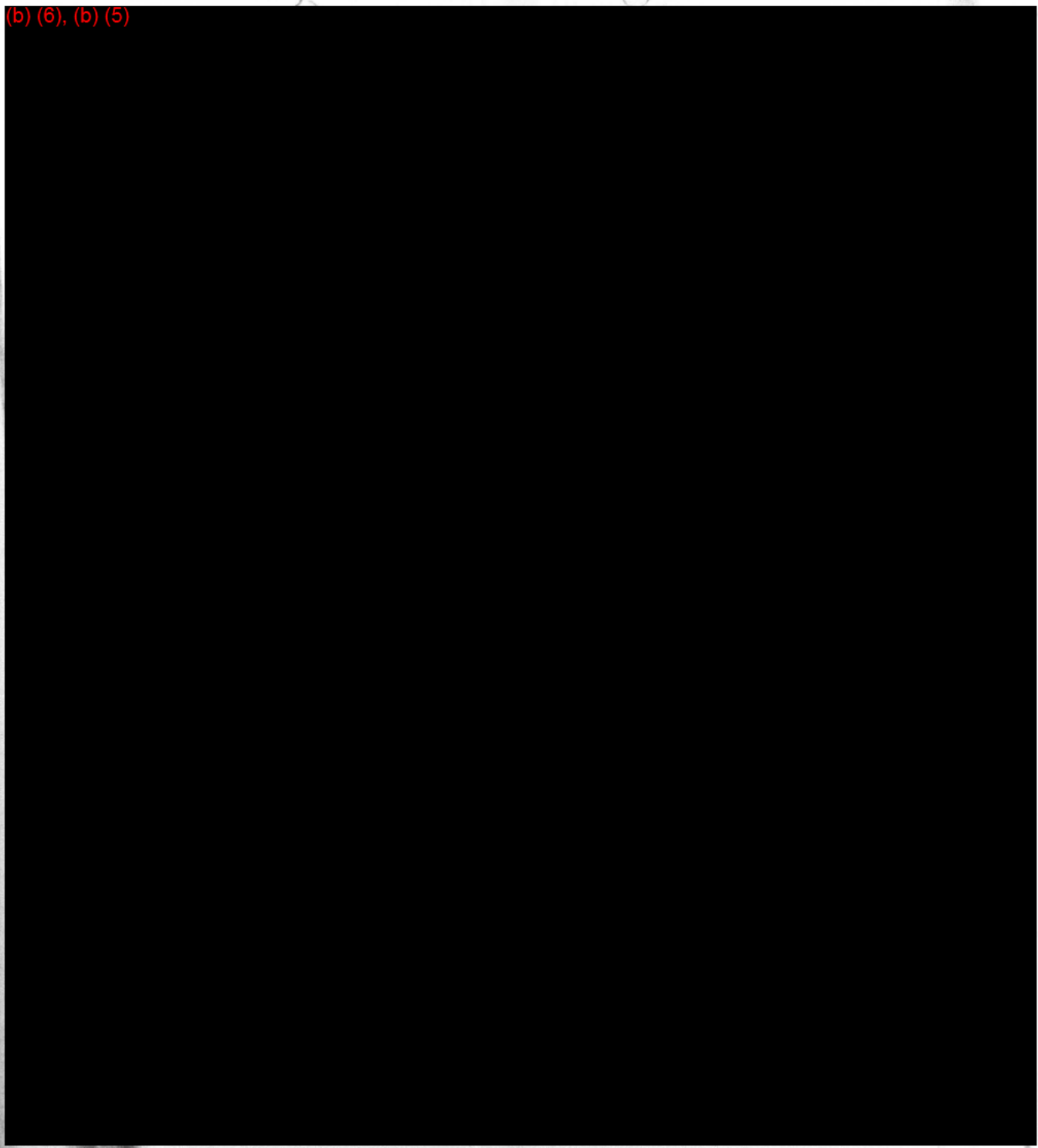
(Encl. 10)



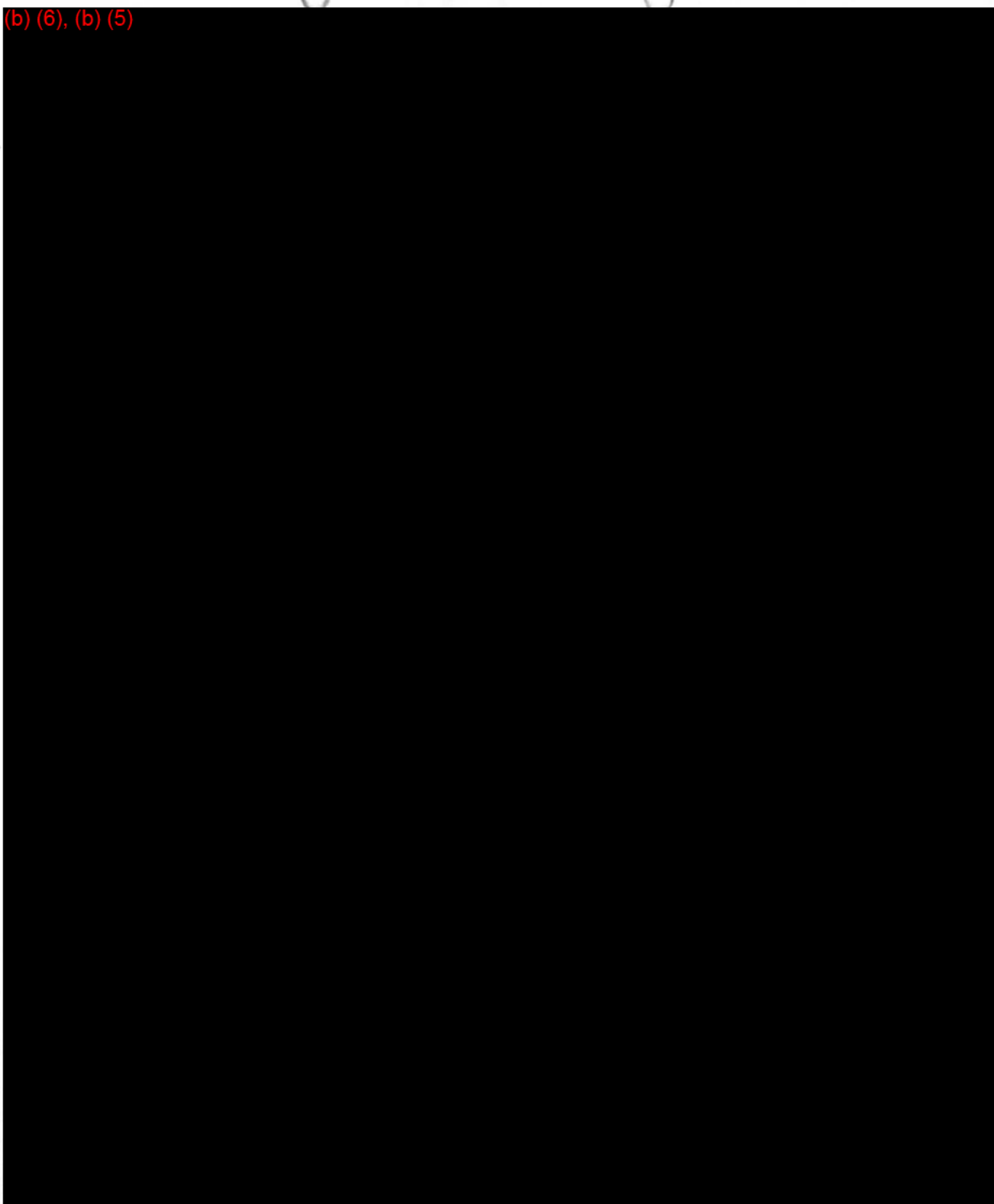
(b) (6), (b) (5)



(b) (6), (b) (5)



(b) (6), (b) (5)



HELICOPTER RESCUE REPORT
OPNAV FORM 3750-12 (REV. 4-59)

OPNAV REPORT 3750-12

- INSTRUCTIONS: 1. Mail original and one copy direct to NASC and one copy direct to CNO.
2. Report will be submitted within five working days of rescue or attempted rescue.
3. Serialize by calendar year (e.g., first report for 1959 would be 1-59, second 2-59)

4. Use local time.
5. If exact data is unknown such as time, temperature, etc. give approximate data.
6. Enclosures will be appended to the report if the statement will amplify the data on the form (e.g., Survivor had difficulty due to insufficient training.
7. Refer to the effective edition of OPNAVINST 3750.6

FROM: MCAAS Yuma, Arizona		REPORT DATE 11 September 1961	REPORT SERIAL NO. 3-61
TO: Commander, U.S. Naval Aviation Safety Center		HELICOPTER MODEL HRS-3	BUNO 141230
CPOY TO: Chief of Naval Operations		OPERATING BASE MCAAS Yuma	
DATE OF EMERGENCY 9 September 1961	TIME (Local) 0910	LOCATION OF EMERGENCY 12 miles SE of MCAAS Yuma, Arizona	
TIME AND METHOD OF NOTIFICATION OF EMERGENCY 0910 Crash Phone	TIME OF ARRIVAL AT SCENE 0930T	TIME OF ACTUAL RESCUE 0930T	TOTAL ELAPSED FLIGHT TIME 0.8

HELICOPTER RESCUE PERSONNEL NAME - LAST, FIRST, MIDDLE INITIAL	RANK, RATE	SERVICE/FILE NO.	RESCUE INSTRUCTION		FORMAL SCHOOL ATTENDED	PICK-UPS	
			FORMAL HRS.	SQU. HRS.		A	S
(b) (6)	Capt	(b) (6)	-	45	-	6	30
(b) (6)	1stLt	(b) (6)	-	3	-	-	15
(b) (6)	Cpl	(b) (6)	-	16	-	4	20

RESCUED PERSONNEL NAME - LAST, FIRST, MIDDLE INITIAL	RANK, RATE	SERVICE/FILE NO.	AGE	HEIGHT	WEIGHT	INJURY - PHYSICAL CONDITION - SURVIVAL GEAR		
						CLASS	(1)	SURVIVAL GEAR USED (Jacket, raft, etc.)
(b) (6)	1stLt	(b) (6)	(b) (6)	73	190	B	A	None

NOTE: (1) Physical Condition Code: A - Conscious, B - Conscious, unable to assist, C - Unconscious

RESCUE CONDITIONS AND PROCEDURES

RESCUE SITE WAS OVER <input checked="" type="checkbox"/> LAND <input type="checkbox"/> WATER	PICK-UP METHOD <input checked="" type="checkbox"/> SET-DOWN <input type="checkbox"/> HOVER	IF HOVER, GIVE RPM AND MP WHILE HOISTING NA RPM, NA MP	EQUIPMENT USED (Sling, seat, etc.) NA
---	---	---	---

NUMBER OF PERSONS AT SCENE NOT RESCUED BY HELICOPTER: 0	REASON NOT RESCUED BY HELICOPTER AND FINAL STATUS NA	PRIMARY AND SECONDARY MEANS OF LOCATING SURVIVORS (Dye marker, flare, smoke, etc.) 1. Directed by Tower. 2. Pilot descending by parachute.
---	--	--

WIND VEL. N 5 Kts.	AIR TEMP. 79	DENSITY ALT. 900	WATER TEMP. NA	SEA STATE NA	GENERAL WEATHER AT SITE H Scattered and B5
------------------------------	------------------------	----------------------------	--------------------------	------------------------	--

MISSION FLOWN BY HELICOPTER PRIOR TO THIS EMERGENCY 1B1	BACK-UP MEANS OF RESCUE None
---	--

RESCUE EQUIPMENT	✓		CHECK "A" - CARRIED, NOT USED OR "B" - REQUIRED, NOT AVAILABLE, AND STATE REASON NOT REQUIRED OR IF REQUIRED, WHY NOT AVAILABLE
	A	B	
Emergency Gear	<input checked="" type="checkbox"/>	<input type="checkbox"/>	-

RECOMMENDED EQUIPMENT AND TECHNIQUES FOR FUTURE RESCUES OF THIS TYPE (By rescue crew or rescuer)

None
* Additional Crew
(b) (6) Lt (b) (6) MD/USN

ENCLOSURE(S) <input type="checkbox"/> PILOT'S STATEMENT <input type="checkbox"/> SURVIVOR'S STATEMENT (indicate number, if more than one)	(b) (6) By direction
--	----------------------

SPECIAL HANDLING REQUIRED IN ACCORDANCE WITH PARA 70, OPNAVINST 3750.6D (Enclosure 7)

0-51078

VJO:EBW
7031

231 *1/2 MAR* *23-retain*
AERONAUTICAL ENGINEERING GROUP
OVERHAUL AND REPAIR DEPARTMENT
U. S. NAVAL AIR STATION
NORTH ISLAND
SAN DIEGO 35, CALIFORNIA

3 OCTOBER 1961

ENGINEERING REPORT NO. 12-61

092123Z SEP 61

SUBJ: MODEL F8U-2 AIRCRAFT, BU NO 146982, STARBOARD WING,
COMPONENTS EXAMINATION; RESULTS OF

REF: (A) VF-124 DET. YNA MSG 142119Z SEP 1961
(B) BUWEPFLEREADREPPAC SPDLTR 2138 5807 OF 15 SEP 1961
(C) NAVWEPS 01-45HHC-2-3, HANDBOOK OF MAINTENANCE
INSTRUCTIONS, REVISED 1 FEB 1961
(D) NAS NI LES 43-252 OF 9 MAR 1959

ENCL: (1) NAS NI PHOTO LAA-18359
(2) NAS NI PHOTO LAA-18360

1. REFERENCE (A) REQUESTED AN ENGINEERING DIR ON SUBJECT AIR-
CRAFT LOST DUE TO LOSS OF RIGHT WING TIP. REFERENCE (B)
AUTHORIZED THE PERFORMANCE OF INVESTIGATION.

2. THE FOLLOWING COMPONENTS OF THE SUBJECT AIRCRAFT WERE RE-
CEIVED FOR EXAMINATION TO DETERMINE POSSIBLE CAUSE FOR LOSS
OF STARBOARD (RIGHT) WING TIP:

- A. RIGHT WING TIP,
- B. FORWARD AND AFT, RIGHT WING, HINGE PIN CYLINDERS,
- C. RIGHT HAND, WING SPREAD SEQUENCE VALVE, P/N 1008463,
S/N 9Y2465,
- D. RIGHT HAND, AFT PIN SAFETY LATCH,
- E. LEFT WING, HINGE SPAR SECTION,
- F. RIGHT HAND OUTER DROOP CYLINDER, P/N 1011940-1,
S/N 969237,
- G. RIGHT HAND CENTER WING, OUTBOARD DROOP CYLINDER,
P/N 189EA-10X, S/N 108,
- H. LEFT HAND CENTER WING, OUTBOARD DROOP CYLINDER,
P/N 189EA. DASH NUMBER UNKNOWN.

3. RESULTS OF EXAMINATION:

A. EXAMINATION OF THE RIGHT WING TIP PANEL REVEALED THE
PANEL HAD SHEARED IN A FORWARD AND UPWARD DIRECTION BEGINNING
AT THE AFT EDGE OF THE LOWER AFT HINGE FITTING. INTERNAL
DIMENSIONS OF THE REMAINING LUG BUSHINGS FROM THE FORWARD AND
AFT OUTBOARD HINGE FITTING ARE:

(1) FORWARD FITTING, P/N CV15-910536-004

(A) FORWARD LUG

VERTICAL

SPANWISE

FORWARD EDGE

0.9390 INCH

0.9393 IN

3072

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3 OCTOBER 1961

AFT EDGE	0.9388	0.9385
(2) AFT FITTING, P/N CV15-910536-006		
(A) FORWARD LUG	VERTICAL	SPANWISE
FORWARD EDGE	0.9390	0.9400
AFT EDGE	0.9383	0.9385
(B) CENTER LUG		
FORWARD EDGE	0.9388	0.9388
AFT EDGE	0.9382	0.9402

NOMINAL PRINT BUSHING I. D. IS 0.938 ± 0.0005 INCH.

THE LOCKING PINS WERE NOT COMPLETELY THROUGH THE HINGE FITTING LUGS AT THE TIME OF SEPARATION OF THE OUTER WING PANEL FROM THE WING. THIS IS EVIDENT BECAUSE OF THE UNDAMAGED LUGS REMAINING ON THE WING OUTER PANEL HINGE FITTINGS. THE LUGS, SHEARED FROM THE OUTER WING PANEL FITTINGS, WERE RECOVERED WITH THE FORWARD AND AFT HINGE PIN CYLINDERS AT THE SCENE OF THE CRASH. THE WING OUTER PANEL HAD A SHALLOW COMPRESSIVE BUCKLE ON THE UPPER SURFACE APPROXIMATELY THREE FEET FROM THE TIP RESULTING FROM GROUND IMPACT.

B. FORWARD AND AFT, RIGHT WING, HINGE PIN CYLINDERS, P/N CV15-901021-008 AND P/N CV15-901030-010. BOTH WING HINGE PIN CYLINDERS WERE RECOVERED FROM THE AREA OF GROUND IMPACT OF THE AIRCRAFT. THE PINS WERE FOUND EXTENDED SUFFICIENTLY TO BE THROUGH ALL OF THE INBOARD LUGS FROM BOTH FITTINGS. THE LUGS SHEARED FROM BOTH THE FORE AND AFT FITTINGS WERE FOUND TO BE POSITIONED BETWEEN THE PROPER LUGS FROM THE INBOARD FITTINGS. IMPACT WITH THE GROUND AND RESULTING JOSTLING OF THE DEBRIS SUBJECTED THE PINS TO A FORWARD MOMENTUM, THEREBY PENETRATING THE REMAINING LUGS. THE LUGS WERE REMOVED FROM THE LOCKING PINS AND THE SECOND LUG FROM EACH OF THE INBOARD FITTINGS CUT IN HALF.

NOTE: THIS WAS THE SUSPECTED POINT OF PENETRATION FOR THE LOCKING PINS IN BOTH FITTINGS. EXAMINATION AFTER CUTTING REVEALED BOTH THE FORWARD AND AFT LUG BUSHINGS HAD DEFINITE MARKS. SEE ENCLOSURES (1) AND (2).

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C. RIGHT HAND WING SPREAD SEQUENCE VALVE, P/N 1008463,
S/N 9Y2465:

(1) THIS VALVE WAS STAMPED AS HAVING BEEN ASSEMBLED AT CHANCE VOUGHT 3RD QUARTER 1959. NO OTHER OVERHAUL OR REPAIR INDICATED. THE INTERNAL COMPONENTS OF THE VALVE WERE MISSING. THE HOUSING, P/N 1007168, HAD SHEARED THE FOUR RETAINING SCREWS, P/N AN501-A10-8. THE SHEARING OF THE SCREWS PERMITTED ALL INTERNAL COMPONENTS TO BECOME SEPARATED FROM THE HOUSING BODY. DIRECTION OF SHEAR APPEARED TO BE FORWARD AND UPWARD. IT WAS NOT DETERMINED IF THE SHEARING OCCURRED WHEN THE OUTER PANEL SEPARATED OR AS A RESULT OF IMPACT WITH THE GROUND.

D. RIGHT HAND, AFT PIN, SAFETY LATCH, P/N CV15-903050-012, HAD A SLIGHT WEAR INDICATION ON THE INNER EDGE AND FACE.

E. LEFT WING, HINGE SPAR SECTION. THE PORT WING HINGE PINS WERE EXTENDED ALL THE WAY THROUGH THE LUGS. THE FORE AND AFT LOCKING LATCHES APPEARED TO HAVE BEEN IN THE LOCKED POSITION. THE MUTILATED CONDITION OF THIS SECTION PRECLUDED ANY DEFINITE STATEMENT AS TO CONDITION. THE LEFT WING FRONT LOCKING ASSEMBLY MECHANISM WAS MISSING.

F. RIGHT HAND OUTER DROOP CYLINDER, P/N 1011940-1, S/N 969237. THIS UNIT WAS CLEANED AND INSTALLED ON THE TEST BENCH. ALL TEST REQUIREMENTS WERE MET WITH NO INDICATION OF INTERNAL LEAKAGE.

G. RIGHT HAND CENTER WING, OUTBOARD DROOP CYLINDER, P/N 189EA-10X, S/N 108. THIS UNIT WAS CLEANED AND INSTALLED ON THE TEST BENCH. ALL TEST REQUIREMENTS WERE MET WITH NO INDICATION OF INTERNAL LEAKAGE.

H. LEFT HAND CENTER WING OUTBOARD DROOP CYLINDER, P/N 189EA, DASH NUMBER UNKNOWN. DATA PLATE MISSING FROM UNIT. IT WAS IMPOSSIBLE TO TEST DUE TO CRACKED HOUSING. DISASSEMBLY DISCLOSED NO APPARENT MALFUNCTION OF UNIT PRIOR TO GROUND IMPACT.

4. CONCLUSIONS:

A. THE COMPRESSIVE BUCKLE IN THE UPPER SURFACE OF THE WING OUTER PANEL IS BELIEVED TO HAVE RESULTED DURING GROUND IMPACT. IT IS FURTHER BELIEVED THAT FAILURE OF THE WING OUTER PANEL ATTACHING STRUCTURE RESULTED FROM FAILURE OF THE WING HINGE LOCKING PINS TO ENGAGE ALL OF THE LUGS, THUS PLACING

UNDUE LOADS ON THE TWO OUTER PANEL LUGS, WHICH WERE ENGAGED. ENCLOSURES (1) AND (2) INDICATE THE POSITION OF PINS IN THE SECOND LUG FROM THE REAR OF EACH INBOARD FITTING. THERE WAS NO INDICATION OF RUBBING OR MISALIGNMENT TO THE FRONT OR REAR FACES OF THE REMAINING LUGS STILL ATTACHED TO THE OUTER WING PANEL. THE WEAR OF THE OUTER PANEL HINGE FITTING BUSHINGS WAS NOT BELIEVED TO LIMIT THE HINGE LOCKING PINS FROM FULLY EXTENDING. THE WEAR PATTERN IN THE BUSHING LUGS, AS SHOWN IN ENCLOSURES (1) AND (2), WAS APPARENTLY FROM THE LOCKING PINS EXTENDING TO THESE POINTS AND THEN THE WHOLE FITTING BEING SUBJECTED TO VIBRATORY AS WELL AS FLIGHT LOADS.

B. THE WING SPREAD SEQUENCE VALVE, P/N 1008463, WAS BELIEVED TO BE THE MAJOR CONTRIBUTING CAUSE FOR THE MISPOSITIONING OF THE LOCKING PINS. A SIMILAR CONDITION OF THE LOCKING PINS EXTENDING INTO THE THIRD LUG WAS EXPERIMENTALLY DUPLICATED BY A SLIGHT CHANGE IN THE ADJUSTMENT OF THE ADJUSTING SCREW IN A SIMILAR VALVE. REFERENCE (C), SECTION 11, PAGE 261, PARAGRAPH 1179, DESCRIBES THE RIGGING OF THIS VALVE. IT IS POSSIBLE, DURING RIGGING, TO ADJUST THE SCREW AND, WHILE LOCKING THE JAM NUT, CHANGE THE POSITION OF THE ADJUSTING SCREW AND THEN SAFETY WIRE THE VALVE WITH THE RESULT THAT THE LOCKING PINS WILL NOT FULLY EXTEND UPON SPREADING THE WINGS. REPEATED FOLDING AND SPREADING OF THE WINGS CAN CAUSE BENDING AND PEENING OF THE STRIKER BRACKET, WHICH WOULD AFFECT THE ADJUSTMENT OF THE SCREW. THIS, THEN, WOULD PREVENT THE FULL EXTENSION OF THE LOCKING PINS. REFERENCE (D) CAUTIONS AGAINST THE HAPHAZARD ADJUSTMENT OF THE SCREW. IN ADDITION, REFERENCE (D) REQUIRES AN INSPECTION OF THIS VALVE TO INSURE PROPER FUNCTIONING OF THE LOCKING PINS AND WARNING FLAGS.

C. THE WORN AREA ON THE HINGE PIN LOCKING LATCH WAS BELIEVED TO HAVE RESULTED FROM CONTACT WITH THE LOCKING PIN LIP.

D. NO MALFUNCTION ATTRIBUTED TO THE DROOP CYLINDERS SUBMITTED FOR INVESTIGATION.

E. IT WAS CONCLUDED THAT THE LEFT WING HINGE PINS WERE FULLY EXTENDED AND PRESUMED TO HAVE BEEN LOCKED. CONCLUSIVE EVIDENCE WAS LACKING DUE TO CRASH DAMAGE.

5. RECOMMENDATIONS: IT IS RECOMMENDED THAT:

A. DURING RIGGING OF THE WING SPREAD SEQUENCE VALVE, P/N 1008463, THAT EXTREME CAUTION BE PRACTICED TO INSURE THE FULL EXTENSION OF THE LOCKING PINS.

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B. THAT JAM NUT, P/N NAS 509-4, BE UTILIZED WHICH INCORPORATES SAFETY WIRE HOLES. ALSO, THAT INSTRUCTIONS BE ISSUED TO SAFETY THE SHAFT, NUT AND BOLT HEAD IN A CONTINUOUS SAFETY-WIRE LOCK.

C. A SIGNAL DEVICE BE INCORPORATED WHICH, WHEN THE LOCKING PINS ARE FULLY EXTENDED, GIVES AN INDICATION IN THE COCKPIT THAT THE PINS HAVE FULLY EXTENDED.

REPORT BY

(b) (6)

APPROVED:

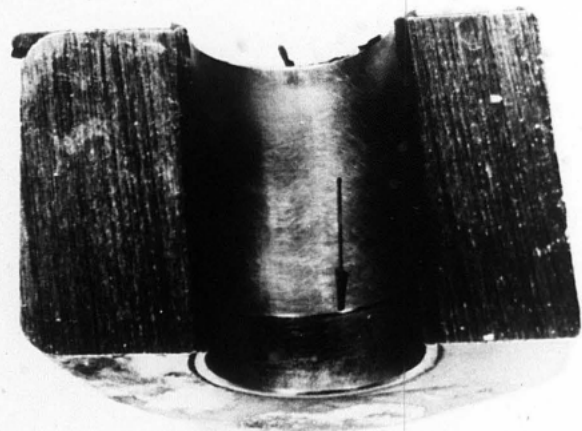
(b) (6)

(b) (6)

AERONAUTICAL ENGINEERING SUPT.

COPY TO:
VF-124 (MAINT. OFF.)
BUWEPs (FWAE)
NASC NORVA
NAS NORVA (O&R)
BUWEPsFLEREADREPPAC
BUWEPsFLEREADREPLANT
COMNAVAIRPAC
COMNAVAIRLANT
CHANCE VOUGHT, VIA BUWEPsREP, DALLAS

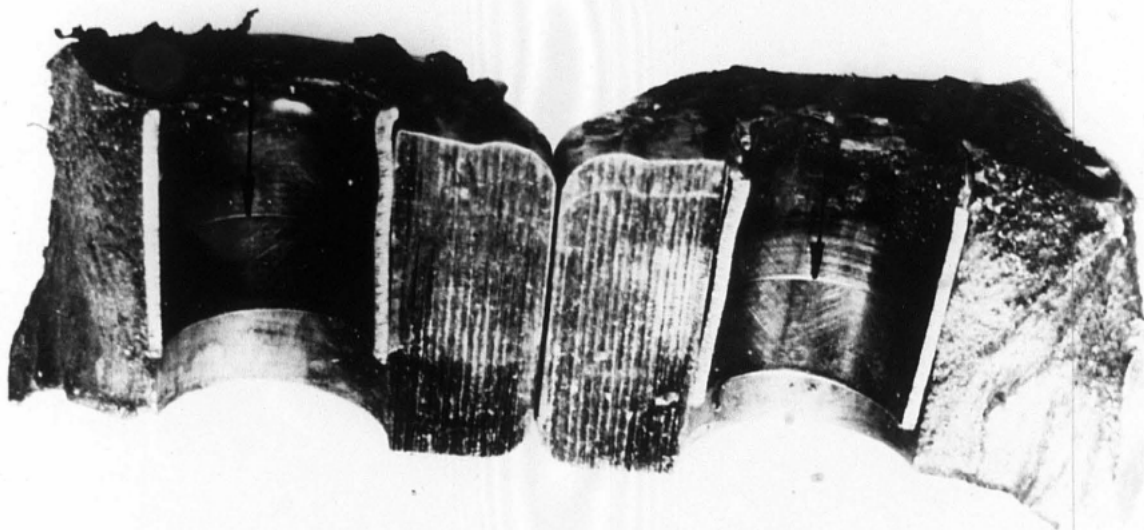
FWD



AFT HINGE FITTING

ENCLOSURE (1)

FWD



FWD HINGE FITTING

ENCLOSURE (2)

SECTION A - IDENTIFICATION

1. Name and mailing address of activity) VF-124 USMCAAS, YUMA, ARIZONA		2. MOR NUMBER 1-61	
3. Signature of Medical Officer) (b) (6)		4. Signature of Appointing Authority) (b) (6)	
5. DATE 22 Sept 61		6. DATE 22 Sept 61	
7. TIME AND ZONE 0900 T		8. DATE 9 Sept 61	
9. MODEL A/C F8U-2		10. BUNO 146982	
11. NO. OF OCCUPANTS 1		12. TYPE ACCD. E-1/G-7	
13. DAMAGE CODE A		14. UNIT OPERATING A/C VF-124	
15. TYPE OF MISHAP <input checked="" type="checkbox"/> ACCIDENT <input type="checkbox"/> GROUND ACCIDENT <input type="checkbox"/> INCIDENT		16. TIME OF MISHAP 0900 T	
17. DATE 9 Sept 61		18. LOCATION MCAAS, Yuma, Arizona	
19. NAME (Last, first and middle initials) (b) (6)		20. UNIT TO WHICH ATTACHED TAD VF-124	
21. RANK 1stLT		22. FILE/SERV. NO. DESIGNATOR (b) (6)	
23. BILLET Pilot		24. BRANCH OF SERVICE USMC	
25. INJURY CODE E		26. DISPOSITION E	
27. CLARIFICATION OF ITEMS 15-22 WHEN NECESSARY #16, TAD from VMF-334 to VF-124			
28. MODEL - OTHER A/C IF INVOLVED		29. BUNO	
30. NO. OF OCCUPANTS		31. UNIT OPERATING A/C	
32. DAMAGE CODE		33. REPORT NO.	

30. DETAILED NARRATIVE ACCOUNT OF ACCIDENT (Use additional 8 X 10 1/2 plain sheets if required)

See Addendum

SECTION B - MEDICAL OFFICER'S QUESTIONNAIRE

YES	NO	DID THE FLIGHT SURGEON:	(If "NO" state reason in space below.)
<input checked="" type="checkbox"/>		1. VISIT THE SCENE OF THE MISHAP?	Squadron was deployed to Yuma, Arizona at the time of the accident and the AAR Board felt Flight Surgeon presence at the site was not indicated.
<input checked="" type="checkbox"/>		2. PARTICIPATE FULLY IN THE FIELD INVESTIGATION?	
<input checked="" type="checkbox"/>		3. PARTICIPATE FULLY IN THE DELIBERATIONS OF THE A/C ACCIDENT BOARD?	
4. IN FIELD INVESTIGATION		5. IN BOARD DELIBERATIONS	
6. IN PREPARATION OF THIS REPORT		7. IN PREPARATION OF THIS REPORT	
8. REPORT PREPARATION CHECK LIST			
<input checked="" type="checkbox"/> ALL PARTS OF FORM COMPLETED <input checked="" type="checkbox"/> SURVIVORS NARRATIVES <input type="checkbox"/> PHOTOS <input checked="" type="checkbox"/> CONCLUSIONS AND RECOMMENDATIONS <input checked="" type="checkbox"/> REQUIRED COPIES FURNISHED			

ADDENDUM to Page #1, Item 30 of MOR 1-61, VF-124

Pilot was on a routine gunnery run at 20,000 ft. On his last pass he decided that his approach was unsatisfactory in regard to tow target alignment, did not fire, and was in a right bank pulling approximately 4 G attempting to regain "perch" position. At this time he believes that right wing entered slipstream of tractor aircraft. Immediately thereafter his aircraft went into an uncontrolled maneuver to the right in a violent fashion. Aircraft continued in this uncontrolled "corkscrew" motion and although pilot's head was banging both sides of canopy in this violent maneuver he managed to reach control to pneumatically depress leading edge droop as a method to recover from spin. Sufficient control was regained to stop the spin and he remained in a 120 deg. dive at 550 kts. He elected not to pull face curtain although he was able to reach it and had done so at least twice during descent. Pilot regained level flight at 4,000 feet with 350 kts. IAS, assessed damage via rear view mirrors and could see that right wing was severely damaged. He commenced a climb to 10,000 feet where slow flight was attempted unsuccessfully since plane tended to become uncontrollable below 250 kts. Having been in contact with squadron mates during this period, he began ascent to 20,000 feet and announced his intentions to eject. Ejection was satisfactorily accomplished at this altitude, 250 kts. and a 45 deg bank, the latter a result of aircraft's tendency to roll in this direction in spite of pilot applying stick pressure with right knee. Ejection and survival gear functioned without difficulty and pilot reached ground without injury.

MEDICAL OFFICER'S REPORT OF A/C ACCIDENT, INCIDENT, OR GROUND ACCIDENT—Page 2

OPNAV FORM 3750-8A (REV. 5-58)

OPNAV REPORT 3750-7

SECTION C—PHYSIOLOGICAL, HUMAN ENGINEERING, DESIGN, SOCIO-PSYCHOLOGICAL, AND TRAINING FACTORS WHICH CONTRIBUTED IN SOME DEGREE TO THIS A/C ACCIDENT, INCIDENT, OR GROUND ACCIDENT

NAME OF INDIVIDUAL (Last, first, middle)

MODEL A/C

(b) (6)

F8U-2

Check E—Established, S—Suspected, or P—Present for each factor selected. Additional 8X10½ plain sheets will be used for the supporting account of items checked below. Identify each statement with the factor and section identification (e.g., C1, C2, etc.). Attach all sheets pertaining to these factors to this form upon completion.

E	S	P	✓ FACTORS	E	S	P	✓ FACTORS
			PHYSIOLOGICAL:				SOCIO-PSYCHOLOGICAL: (Emotional stress from duty sources)
			1. Physically incapacitated in flight				29. Expeditings/Delays
			2. "G" forces				30. Weather
			3. Environmental stress - External				31. Mechanical Problems
			4. - Internal				32. Social and working relationships
			5. Dysbarism/explosive decompression				33. Personal comfort
			6. Diet				34. Regulations
			7. Fatigue				35. Facilities
			8. Hypoxia				36. Navigation
			9. Related illness				37. Duty assignment
			10. Vertigo/Disorientation/Illusions				38. Personality traits
			11. Hyperventilation				NON-STRESS FACTORS:
			12. Drugs				39. Faulty attention
			13. Physical state				40. Poor judgement
			14. OTHER:				41. Forgetfulness
			HUMAN ENGINEERING AND DESIGN:				42. OTHER SOCIO-PSYCHOLOGICAL FACTORS
			15. Personal equipment				
			16. Displays and/or controls				
			17. Work arrangement				
			18. Working environment				
			19. Habit interference				TRAINING FACTORS:
			20. OTHER:				43. Physiological training
			SOCIO-PSYCHOLOGICAL: (Emotional stress from non-duty sources)				44. Emergency Procedures training
			21. Pregnancy				45. Survival and rescue training
			22. Illness or death				46. Refresher training
			23. Arguments				47. Transition training
			24. Elated/Depressed state				48. OTHER:
			25. Personal habits - Drinking				
			26. - Sex				
			27. - Gambling				
			28. - Debts				

SECTION D — AIR CREW DATA (fill in where applicable)

1. Flight time past 30 days	30	7. Total time in model	40 hrs
2. Flight time last 24 hours	2	8. Number of days grounded last month, give reason	None
3. Number of flights in last 24 hours	3	9. Number of and dates of previous accidents	None
4. Time at controls this flight	55 min.		
5. Number of hours duty last 24 hours	8 hrs		
6. Total flight time	350 hrs		

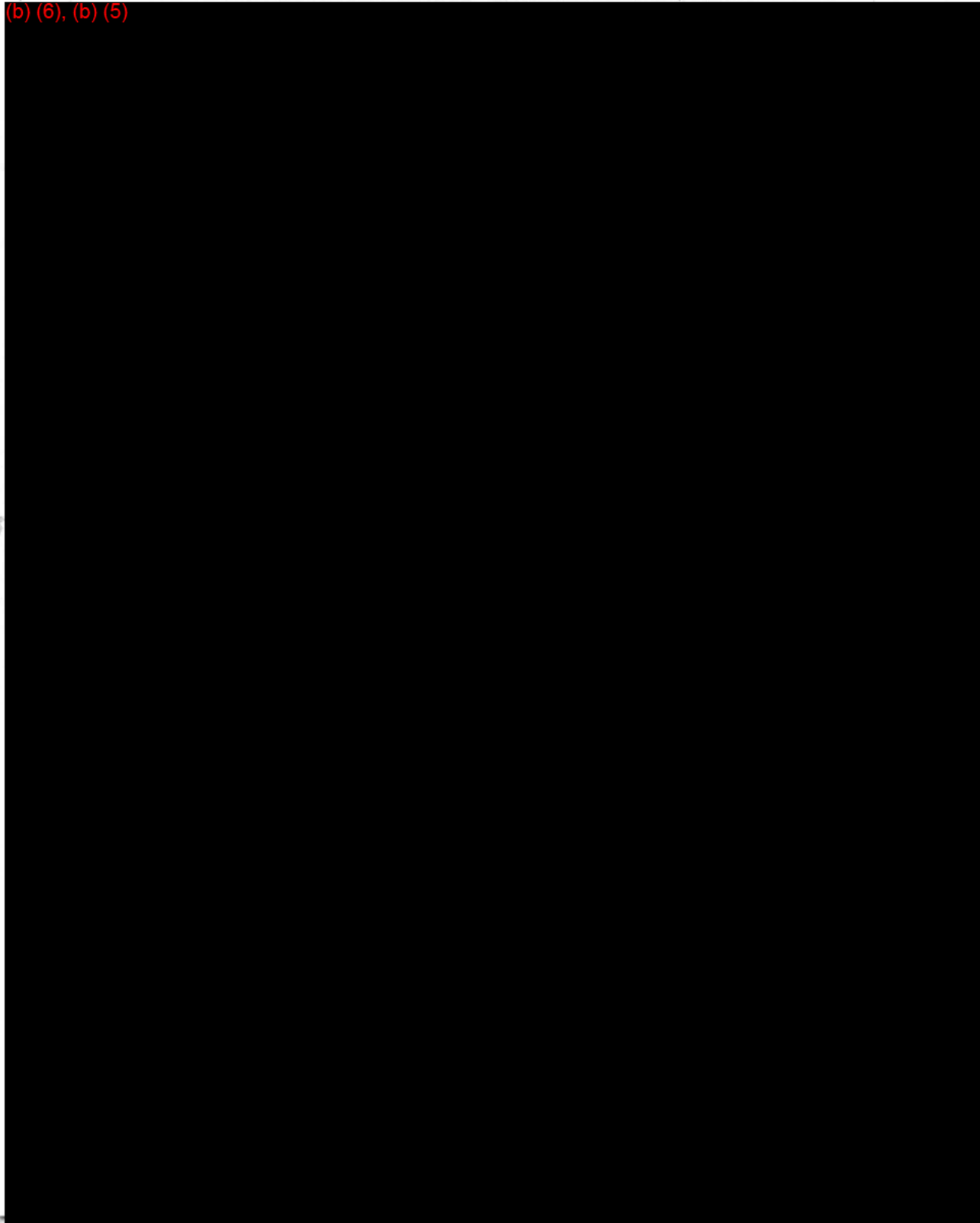
SECTION E — CONTRIBUTING FACTORS AND THEIR ANALYSIS (As condensed from Part I, Sect. D and Part VIII of the ARR)

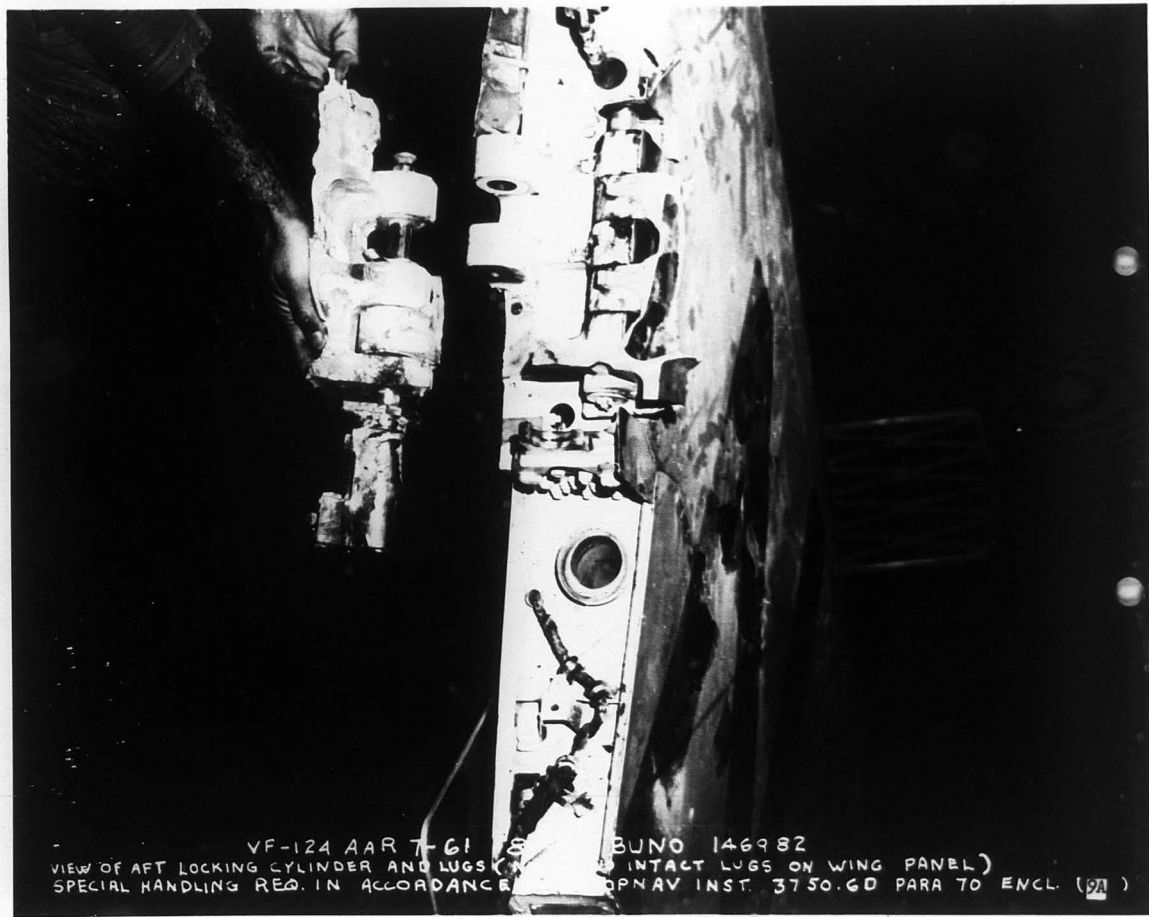
NOTE: Fill in this section only on that set of forms prepared for FIRST individual listed in Section A, i.e. 15(a). Attach additional sheets as necessary.

No physiologic or psychiatric factors involved. Pilot election not to eject when in spin is open to question, but successful ejection later is hard to find fault with.

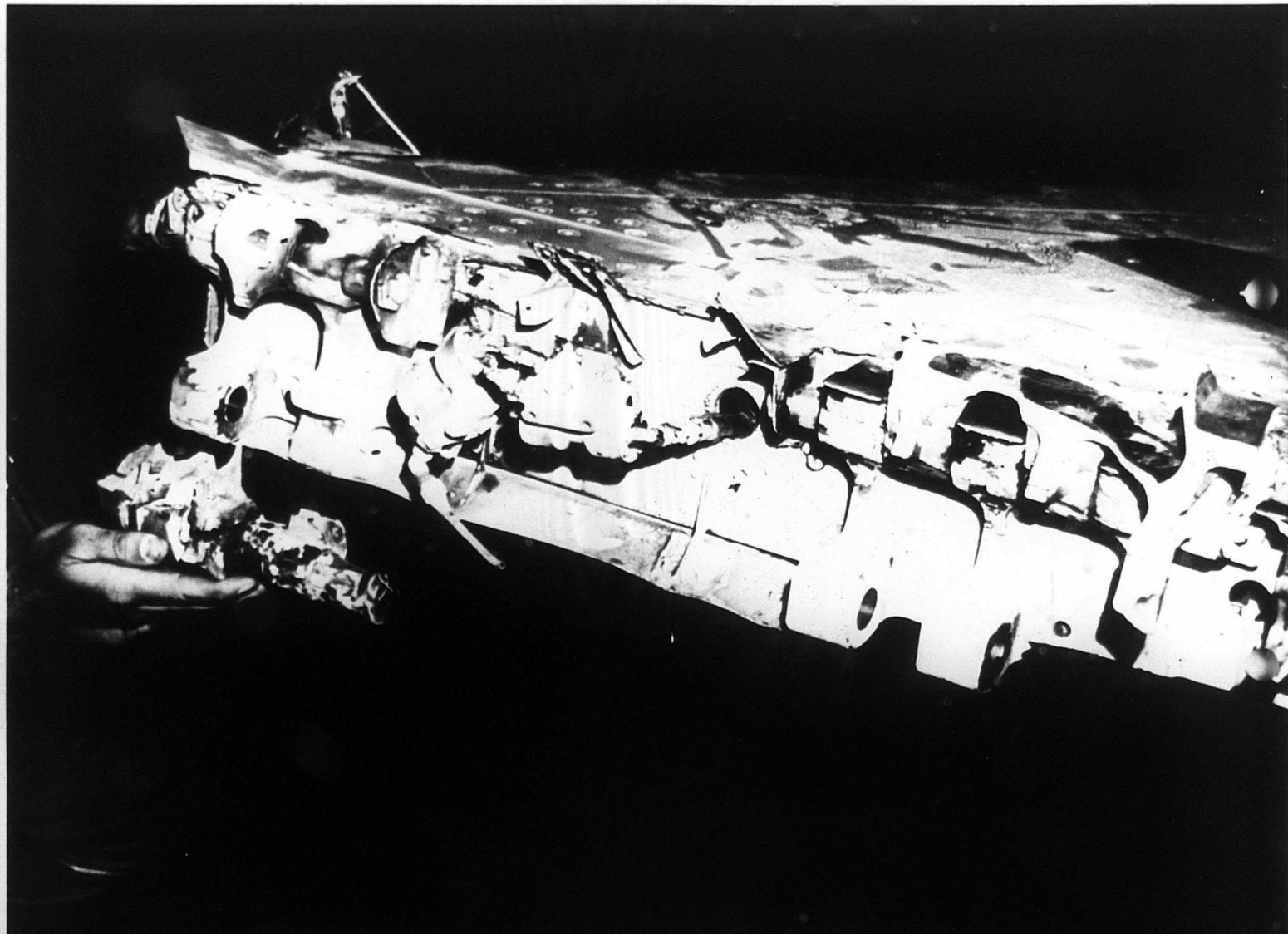
SEC. I. G - DETAILED EQUIPMENT QUESTIONNAIRE (Continued)

(b) (6)		MODEL A/C F8U-2
RESTRAINT HARNESS	19. INTEGRATED HARNESS SYSTEM, MODEL/TYPE MB F-5	
	20. INTEGRATED? <input checked="" type="checkbox"/> FULL <input type="checkbox"/> PARTIAL	
	21. MODIFICATIONS, IF ANY STATE REASON	
	22. DID INTEGRATED HARNESS FIT PROPERLY? IF NO, LIST DISCREPANCIES IN FIT AND GIVE REASONS THEREFOR <input type="checkbox"/> NO <input checked="" type="checkbox"/> YES	
HELMET	23. INTEGRATED HARNESS FITTING WAS CONDUCTED BY: <input type="checkbox"/> WEARER <input type="checkbox"/> FLIGHT SURGEON <input checked="" type="checkbox"/> PARACHUTE RIGGER <input type="checkbox"/> AVIATION EQUIPMENT OFFICER <input type="checkbox"/> OTHER	
	24. IF SHOULDER HARNESS WAS USED, WAS IT: <input checked="" type="checkbox"/> LOCKED <input type="checkbox"/> UNLOCKED <input checked="" type="checkbox"/> TIGHT <input type="checkbox"/> SLACK <input type="checkbox"/> OTHER CONDITION	
	25. TYPE HELMET AH-5	26. LIST PRESCRIBED MODIFICATIONS Neck and Nape Strap
	27. OTHER MODIFICATIONS AND REASON FOR THEM	
PARACHUTE	28. DID HELMET FIT PROPERLY? IF NO, GIVE REASON <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	
	29. HELMET FITTING WAS CONDUCTED BY: <input type="checkbox"/> WEARER <input type="checkbox"/> FLIGHT SURGEON <input checked="" type="checkbox"/> PARACHUTE RIGGER <input type="checkbox"/> AVIATION EQUIPMENT OFFICER <input type="checkbox"/> OTHER	
	30. TYPE CHUTE MB F-5	31. LAST PACKING DATE Unk.
	32. MODEL/TYPE RAILOUT OXYGEN U-Tube	33. AUTOMATIC RIPCROD, IF INSTALLED (Model and type) <input type="checkbox"/> NONE F-5
	34. DID AUTOMATIC RIPCROD FAIL? IF YES, WHY? <input checked="" type="checkbox"/> NO	
	35. WAS RIPCROD ACTIVATION <input type="checkbox"/> MANUAL <input checked="" type="checkbox"/> AUTOMATIC?	
	36. IF MANUALLY ACTIVATED STATE REASON AND ANY DIFFICULTIES ENCOUNTERED	
	37. DID CHUTE OPEN IMMEDIATELY? IF NO, GIVE REASON <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	
	38. ALTITUDE THAT CHUTE OPENED 11,000 FEET	
	39. OPENING SHOCK WAS: <input type="checkbox"/> SLIGHT <input checked="" type="checkbox"/> MODERATE <input type="checkbox"/> SEVERE	40. BODY ATTITUDE AT OPENING Sitting
41. CONDITION OF CHUTE AFTER OPENING Full		
42. CHUTE OSCILLATION PRESENT: <input type="checkbox"/> NONE <input checked="" type="checkbox"/> SLIGHT <input type="checkbox"/> MODERATE <input type="checkbox"/> SEVERE		
43. IF OSCILLATION WAS PRESENT, HOW WAS IT STOPPED?		
44. WEATHER CONDITIONS DURING DESCENT (List in sequence) Ideal		
45. TOPOGRAPHY OF LANDING SITE Desert sand-flat		
46. WAS RAILOUT OXYGEN CONNECTED? <input checked="" type="checkbox"/> BEFORE EXIT <input type="checkbox"/> AFTER EXIT <input type="checkbox"/> NO <input type="checkbox"/> N.A.		
47. WAS RAILOUT OXYGEN USED? IF NOT, WHY <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO		
48. WHEN WAS IT ACTIVATED? <input type="checkbox"/> BEFORE EXIT <input checked="" type="checkbox"/> AFTER EXIT		
49. GIVE DIFFICULTIES ENCOUNTERED WITH RAILOUT OXYGEN AND THEIR CAUSE, IF ANY		
50. WAS CHUTE HARNESS <input checked="" type="checkbox"/> TIGHT <input type="checkbox"/> SHUG <input type="checkbox"/> LOOSE		
51. WAS A SITTING POSITION IN SLING OBTAINED DURING DESCENT? IF NOT, WHY? <input type="checkbox"/> NO <input type="checkbox"/> YES <input checked="" type="checkbox"/> NOT ATTEMPTED		
52. SEAT CUSHION IF PROVIDED (Model/Type) <input type="checkbox"/> NONE MB F-5 pack		
53. WAS PARACHUTE LANYARD CONNECTED TO LIFE VEST D RING? IF NOT, WHY? <input type="checkbox"/> NO <input checked="" type="checkbox"/> YES		
54. LIST TYPE OF PARACHUTE TRAINING COMPLETED BY THIS INDIVIDUAL <input type="checkbox"/> NONE Pre-Flight		
55. IF ATTEMPT WAS MADE TO RELEASE PARACHUTE DURING DESCENT, WAS RELEASE ACTIVATED SUCCESSFULLY? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO		
56. IF NO, GIVE REASON Desert		
OTHER	57. IF G-SUIT, EXPOSURE SUIT, FULL OR PARTIAL PRESSURE SUIT WAS WORN, DID IT FIT PROPERLY? IF NOT, LIST DISCREPANCIES IN FIT AND GIVE REASONS THEREFOR. <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	
	58. WAS G-SUIT EQUIPPED WITH A SPRING-LOADED DISCONNECT ADAPTER? IF NO, GIVE REASON <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	
	59. LIST ALL ITEMS OF NON-STANDARD CLOTHING OR SURVIVAL EQUIPMENT UTILIZED None	
	60. WAS ANY ITEM OF EQUIPMENT LOST? IF YES STATE ITEM, WHEN LOST, AND REASON FOR LOSS. <input checked="" type="checkbox"/> NO <input type="checkbox"/> YES	61. WAS ANY ITEM OF EQUIPMENT DISCARDED? IF YES, STATE ITEM, WHEN DISCARDED, AND REASON FOR DISCARD. <input checked="" type="checkbox"/> NO <input type="checkbox"/> YES





VF-124 AAR 7-61 18 BUNO 146982
VIEW OF AFT LOCKING CYLINDER AND LUGS (WING PANEL) (INTACT LUGS ON WING PANEL)
SPECIAL HANDLING REQ. IN ACCORDANCE WITH OPNAV INST. 3750.6D PARA 70 ENCL. (97)




VF-124 AAR 7-61 F8U-2 BUNO 146982
VIEW OF 'FWD' LOCKING CYLINDER AND LUGS (NOTE ONE LUG IS STILL INTACT)
SPECIAL HANDLING REQ. IN ACCORDANCE WITH OPNAV INST. 3750.60 PARA 70 ENCL. (9B)



VF-124 AAR 7-61 FBU-2 BUNO 146982

VIEW OF AFT LOCKING CYLINDER


SPECIAL HANDLING REQ. IN ACCORDANCE WITH OPNAV INST. 3750.6D PARA 7C ENCL (50)



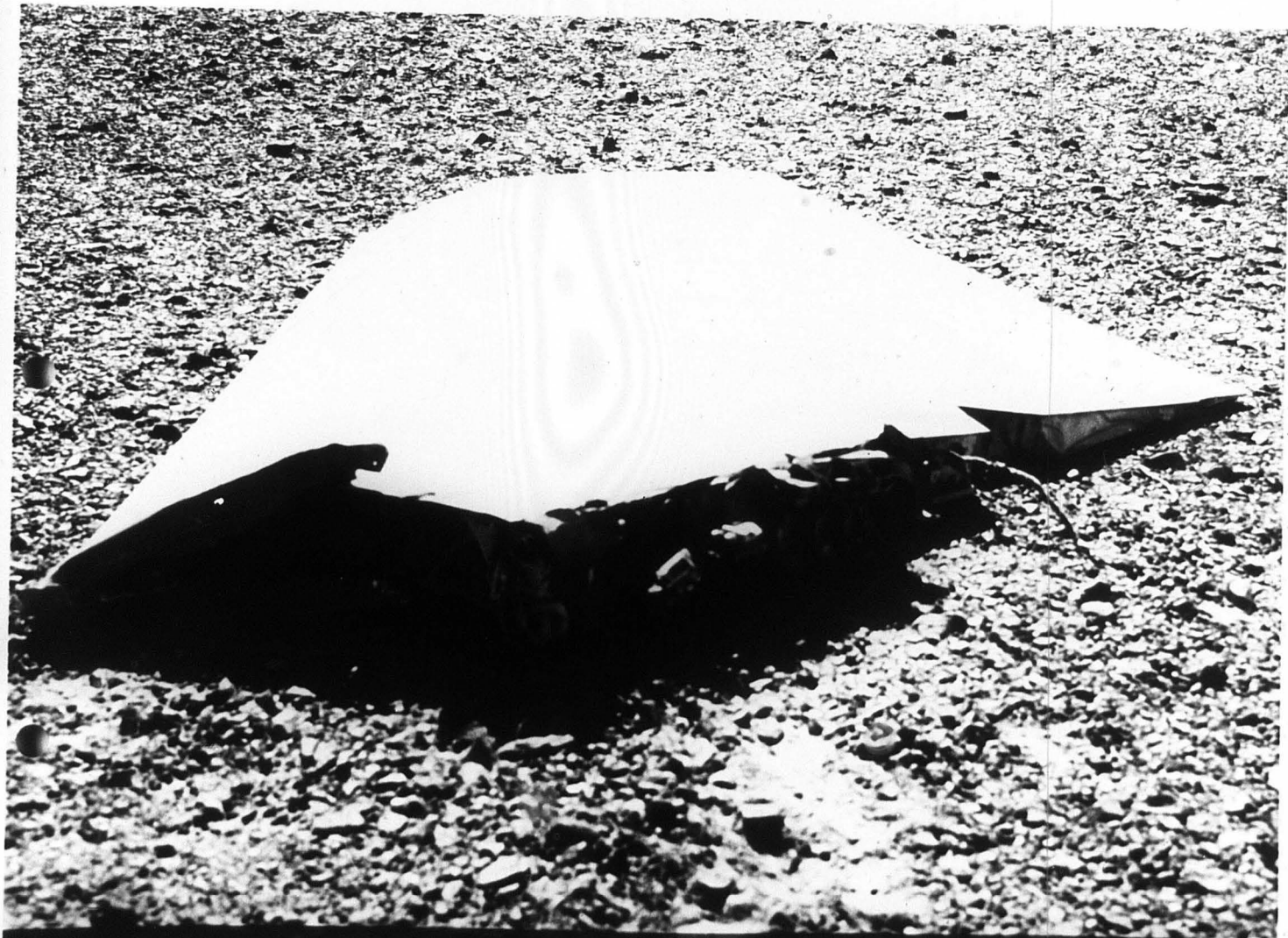
VF-124 AAR 7-61 FBU-2 BUNO 146482 — OVERHEAD VIEW OF CRASH
SPECIAL HANDLING REQ. IN ACCORDANCE WITH OPNAV INST 3750.60
PARA 7D ENCLOSURE (8A)



VF-124 AAR 7-61 FSJ-2 BUN0146982 VIEW LOOKING NW
SPECIAL HANDLING REQ. IN ACCORDANCE WITH OPNAV INST. 3750.60
PAAA 70 ENCLOSURE (8B)



VF-124 AAR T-61 F8U-2 BUONO 146982 VIEW LOOKING SE
SPECIAL HANDLING REQ. IN ACCORDANCE WITH OPNAV INST. 3750.6D
PARA 70 ENCLOSURE ()



VF-124 AAR 7-61 F8U-2 BUNO 146982
VIEW OF WING PANEL AS FOUND ON GUNNERY RANGE
SPECIAL HANDLING REQ. IN ACCORDANCE WITH OPNAV INST. 3759.6D PARA 7D ENCL. (8D)



VF-124 AAR 7-61 FBU-2 BUNO 146982
VIEW OF BUCKLE TO TOPSIDE OF STARBOARD WING PANEL
SPECIAL HANDLING REQ IN ACCORDANCE WITH OPNAV INST 3750.6D PARA 70 ENCL. (8E)